# MARYLAND

ITS

## RESOURCES, INDUSTRIES AND INSTITUTIONS



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PREPARED FOR THE

Maryland. BOARD OF WORLD'S FAIR MANAGERS

OF MARYLAND

BY

MEMBERS OF JOHNS HOPKINS UNIVERSITY

AND OTHERS

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BOARD OF

# WORLD'S FAIR MANAGERS

OF MARYLAND.

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# INTRODUCTORY.

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Maryland, situated between the parallels of 37° 53′ and 39° 44′ north latitude, and the meridians of 75° 04′ and 79° 33+′ west longitude (the exact western boundary being yet undetermined), is one of the upper tier of Southern States. Its boundaries are: Mason and Dixon's line on the north; the State of Delaware and the Atlantic ocean on the east; on the south, a line drawn westward from the ocean to the western bank of the Potomac river, thence following the western bank of that river to its source; and on the west, a line drawn due north from this source to Mason and Dixon's line. Its gross area is 12,210 square miles, of which 9,860 square miles are land surface; the included portion of the Chesapeake Bay, 1,203 square miles; Assateague Bay on the Atlantic coast, 93 square miles; with 1,054 square miles of smaller estuaries and rivers.

The Chesapeake Bay ascends to within a few miles of its northern boundary, dividing the State into what are known as the Eastern and Western Shores.

The rivers, excluding mere estuaries of the bay, are the Potomac, Patuxent, Patapsco, Gunpowder, Susquehanna, Elk, Sassafras, Chester, Choptank, Nanticoke, Wicomico and Pocomoke, all emptying into the Chesapeake Bay. Beside these, the coast-line of the bay is deeply indented with a multitude of creeks, coves, and other estuaries, penetrating the land in all directions, usually bearing the names of rivers, and often navigable to some distance by vessels of light draft. Perhaps nowhere else in the world is there a coast-line proportionately so extensive, or any country offering such facilities for water transportation as tide-water Maryland. Along the ocean frontier runs a narrow reef of sand, inclosing and sheltering Synepuxent and Assateague Bays, and giving inland navigation along the whole Atlantic coast of the State.

Maryland is divided into twenty-three counties, of which Garrett, Alleghany, Washington, Frederick, Carroll, Baltimore, Harford and Cecil

form the northern tier; Howard, Montgomery, Anne Arundel, Prince George's, Calvert, Charles and St. Mary's lie on the west; and Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset and Worcester, on the east side of the bay. Of these twenty-three there are but seven which do not lie on navigable waters.

Maryland presents a great variety of configuration, soil and climate. The four most westerly counties extend through the systems of mountain ranges known as the Alleghany and the Blue Ridge; east of these is the Piedmont region, gently inclining towards tide-water, and on both sides of the bay lies the Coastal Plain. The physical and climatic characteristics of these regions are set forth in a subsequent chapter.

Maryland having originally been a part of Virginia, it was, for many years after its settlement, generally confounded with that colony in the English mind, while those who professed to be better informed, maintained that it was a large island off the Virginia coast. During the rule of the first Proprietary, however, several brief accounts were published, designed to enlighten the public as to the true geographical position of Maryland, its soil, climate, natural productions and government. At that time scarce any part of the province was known except a small portion of the bay shore, and even as late as 1670, Augustine Herrman, who made a map of Maryland, conceived the mountains about Cumberland to be the central ridge between the two oceans, and thought it probable that they might be rich in precious metals, inasmuch as Mexico lay near their western slope.

The first of these accounts, or Maryland Books, bears the title, "A Relation of the Successful Beginnings of the Lord Baltemore's Plantation in Maryland," and was written by one of the first colonists, probably Father White, in May, 1634, two months after the settlement. The author, of course, only knows the country about St. Mary's and the shores of the Potomac; but he is enthusiastic over the delightful climate, the fertility of the soil, the abundance of water and fresh springs, the infinite plenty of game, fish and wild fruits, and the friendliness of the Indians.

Of this Relation, a revised and enlarged edition was published in 1635, accompanied by a map in which the shores of the bay and some of the principal rivers are pretty fairly laid down, and the interior country sketched from imagination. Mountains of formidable size are dotted

liberally over both the Western and Eastern Shores; but the wildest and most alpine peaks are reserved for what are now the counties of Talbot, Queen Anne and Caroline. But a good deal has been learned in a year; and we have here an enumeration of the valuable natural productions of Maryland—medicinal plants, timber, wild fruits and grapes, game, wild fowl and fish. Of minerals the writer reports iron ore, brick clay, fine potters' clay, and marl. The soil is exceedingly fertile and fit for any crop; "and in fine there is scarce any fruit that grows in England, France, Spain or Italy, but has been tried and prospers well." Of the innocence and uniform friendliness of the Indians he has also much to report.

These, and a brief tract or two, were all the published sources of special information about Maryland until 1666, when George Alsop's "Character of the Province of Maryland" appeared. Alsop had spent four years in the province as an indented laborer, and, according to his own account, was so charmed with its manifold excellences and attractions, that he could not rest until he made them more widely known. He felt that no ordinary style would do justice to such a subject, and therefore invented one for the occasion. Those who wish to see how beautiful the world is, and how bounteous Nature, should visit Maryland, for he is well assured that there is no place "under the heavenly altitude, or that has footing or room upon the circular globe of this world, that can parallel this fertile and pleasant piece of ground in its multiplicity; or, rather Nature's extravagancy of a super-abounding plenty." Condescending to particulars, he tells us that the woods teem with wild animals, some valued for their fur, and others for their flesh; and among them may be included the innumerable herds of unclaimed hogs running wild in the woods. Sheep, however, cannot be profitably bred, because of the wolves. Wild-fowl cover the water "in millionous multitudes."

The principal commodities of the country are tobacco, furs, and pork, the former being the staple export, requiring "shipping to the number of twenty sail and upward" in November and December to carry it away; beside which it is the universal currency.

The conditions of labor are light, field-hands working but five and a-half days in the week in summer, and in the two hottest months they are allowed "an ancient and customary privilege to repose themselves

three hours in the day." In the winter months they have only to cut wood for fuel, and may hunt as much as they please, every hand being provided with a gun and ammunition.

Alsop's characterization of the Marylanders is worth quoting. They are, he says, "generally conveniently confident, reservedly subtile, quick in apprehending, but slow in resolving; and where they spy profit sailing towards them with the wings of a prosperous gale, there they become much familiar. The women differ something on this point, though not much. They are extreme bashful at the first view, but after a continuance of time hath brought them acquainted, then they become discreetly familiar, and are much more talkative than men. All complimental courtships drest up in critical rarities are mere strangers to them; plain wit comes nearest their genius; so that he that intends to court a Maryland girle must have something more than the tautologies of a long-winded speech to carry on his designs."

Alsop's little book was, it seems, the last of the publications specially designed to give general information about Maryland. The extension of the colony and of its trade, the establishment of commercial houses in England whose chief dealings were with the province, the visits of travellers and factors, the increase of correspondence, made Maryland no longer an unknown land.

Settlements gradually spread back from the bay coast to the uplands, and wheat and maize began to take their places beside the universal tobacco. When in the last century the western section of Maryland was opened up, the great deposits of iron and coal came to the front as a new field for industry and source of wealth, while the piedmont and mountain regions became the homes of a hardy and industrious population, differing in many respects from that of the tidewater settlements. And as the pioneers and fantassins keep in the front of an advancing army, so the westward march of civilization was preceded by the backwoodsmen, an interesting example of a vanished type. These adventurous spirits, like Michael and Thomas Cresap, built their log-cabins in the primitive forest, where they cultivated small patches of land, but lived mostly on the produce of their rifles. Living near the Indians, they adopted many of their customs; dressed in deerskin hunting-shirts, with leggings and moccasins, carried tomahawk and knife beside the unerring rifle, and were unmatched in all the arts and stratagems of woodcraft.

For the portrait of Maryland under this new aspect, we must go to the journals of tourists and correspondence of letter-writers, to files of old newspapers and bundles of musty manuscripts, and paint our picture with colors taken from many palettes.

The present century has been more remarkable for the utilization of existing material sources of wealth than for the discovery of new; but it has witnessed so extraordinary a development and expansion of the resources and industries of the State, that again the book of Maryland has to be written.

The occurrence of the Columbian Exposition of 1893, at which the various States proposed to display to each other, and to the world, the extent of their resources and the evidences of their material progress, seemed a fitting occasion for the preparation of such a book; and accordingly the Board of Managers, consisting of the Hon. Frank Brown, Governor of the State; the Hon. F. C. Latrobe, Mayor of Baltimore; Hon. Murray Vandiver, Mrs. William Reed, Messrs. David Hutzler, F. S. Hambleton, F. R. Scott, J. Olney Norris, Frank N. Hoen, H. H. Dashiell, James T. Perkins and J. R. Bland, toward the close of October, 1892, approached the Faculty of Johns Hopkins University with the request that they would prepare a work setting forth the resources, industries and institutions of the State.

The design having been explained, and the Trustees of the University having given their sanction, certain of the Faculty undertook to prepare the text and furnish the necessary charts, maps, &c.

An editorial committee was then appointed, consisting of Professor G. H. Williams, chairman, Professors H. B. Adams and W. K. Brooks, Drs. Wm. Hand Browne and W. B. Clark, and Messrs. Milton Whitney and Nicholas Murray. Mr. J. H. Hollander was made corresponding secretary. Prof. Williams undertook the general charge of the chapters treating of physical features, geology, mines and minerals, and agriculture; Prof. Brooks of those dealing with natural history, fish and fisheries, the oyster and the oyster industry; Prof. Adams of those on commerce, manufactures, cities, political and religious institutions, education, populations, and charities and correction, and Dr. Browne contributed the historical sketch, and had editorial supervision of the whole.

The work thus apportioned was allotted to such members of the University as were best qualified to deal with the special subjects, and the name of each contributor will be found affixed to his contribution in the Table of Contents. Important assistance was also obtained from gentlemen not connected with the University, the chapter on Education being contributed by Dr. Bernard C. Steiner, Librarian of the Enoch Pratt Free Library, and that on Population, by J. C. Rose, Esq., of the Baltimore Bar. The article on Medical Climatology was furnished by Dr. C. W. Chancellor, Secretary to the State Board of Health, those on the iron and copper industries by W. Keyser and R. Brent Keyser, Esqs., those on chrome and limestone by W. Glenn and D. Baker, Esqs., and that on the flora of Maryland by Prof. B. Sollers. The editors are also indebted to Dr. A. W. Clement, V. S., and Mr. Lee Clark, for information on the subject of stock-raising.

In addition, valuable assistance has been received from the following gentlemen: Hon. Lloyd Lowndes and Mr. F. M. Offutt, of Cumberland; Mr. Albert Small, of Hagerstown; Dr. D. R. Randall, of Annapolis; Major E. T. Goldsborough and Mr. F. M. Kinsey, of Frederick; Messrs. F. R. Jones, J. G. Schonfarber, W. T. Brigham, L. H. Neudecker, W. M. Byrne and E. H. Sanborn, of Baltimore; Mr. E. C. Carrington, of Easton; Mr. J. A. Chapman, jr., of Chestertown; Rev. J. K. Holmes, of Crisfield; Mr. A. C. Bryan, of Rising Sun; Mr. H. T. Weld, of Mt. Savage; and Mr. Raymond Henderson, of Hancock.

In the collection of data the editors have had occasion to consult or correspond with a large number of persons, and their inquiries have invariably met with a ready and courteous response. To all these friends they now tender their acknowledgments. Thanks are also due to the officers of the Baltimore and Ohio Railroad for kindly permitting the use of selections from their extensive collection of photographic views of scenery on the line of their road.

# MARYLAND.

## CHAPTER I.

### HISTORICAL SKETCH.

The foundation of Maryland is primarily due to George Calvert, first Baron of Baltimore. When that nobleman, who had been a trusted councillor of James I, and had held the office of Principal Secretary of State, became a convert to the Roman Catholic faith, he retired from public life and determined to spend the remainder of his days in the New World. He already held by charter a considerable part of the Island of Newfoundland, called the province of Avalon; and to it he removed with his family in 1628. But after a about a year's sojourn in this bleak region, the extreme severity of the long winters, and the evident impossibility of making Avalon more than a fishing station, determined Baltimore to seek a home in some more genial clime; and he asked the King, Charles I, for a grant of land north of the Potomac, within the territory that had previously been granted to the Virginia Company, but which now, by the legal forfeiture of their charter, was again in the King's hands.

His request was granted, and the charter for his new province made out; but before it had passed the great seal, Baltimore died, and the charter was issued in 1632, to his son, Cecilius Calvert, second Baron of Baltimore, who named his province Maryland, in compliment to the Queen, Henrietta Maria.

The territory thus conveyed was considerably more extensive than that covered by the present State of Maryland, being bounded on the north by the fortieth parallel of north latitude, on the east by the Delaware Bay and River, and the Atlantic Ocean, on the south by a line drawn from the mouth of the Potomac River eastward to the ocean, and on the west by the farther or right-hand bank of the Potomac to its most distant source, and thence due north to the fortieth parallel.

The privileges conveyed by the charter were the most complete ever granted by an English sovereign to a subject: the Proprietary was

invested with palatinate authority, under which were included all royal powers, both of peace and war. The province was entirely self-governed, all laws being made by the Proprietary and the freemen, and these laws required no confirmation from the King or Parliament. By an express clause the King renounced for himself and his successors forever, all right of taxation in Maryland. All that was required of the colonists was that they should be British subjects, and that the Proprietary should acknowledge the King of England as his sovereign, paying him, in lieu of all services or taxes, two Indian arrows yearly, and the fifth of all gold or silver that might be found.

After securing his charter, Cecilius at once set about his preparations for colonisation, and fitted out two small vessels, the *Ark* and *Dove*, in which the first band of colonists set sail on November 20, 1633. These consisted of about twenty gentlemen of good families, all or most of whom were Catholics, and about two hundred laborers, craftsmen, and servants, most of them Protestants. Baltimore's younger brother, Leonard Calvert, was governor and head of the expedition, assisted by two councillors, Jerome Hawley and Thomas Cornwaleys. Careful instructions for their guidance were drawn up by Baltimore, in which, among other things, he charged them to observe strict impartiality, and to give the Protestants no cause of offence.

The *Ark* and *Dove*, after a tedious and stormy passage, during which they touched at several of the West India islands, reached at last their destination, and the colonists landed upon an island at the mouth of the Potomac, where they celebrated divine service and planted a cross on March 25, 1634.

The natives received them in the most friendly manner, and were quite willing that they should settle among them. So they bought from the King of the Yaocomicos a tract of land a few miles up the Potomac, where there was a good harbor, and there laid out the plan of a city, which they called St. Mary's.

Although the settlement of Maryland could be only an advantage to Virginia, yet a powerful party in the latter colony were bitterly hostile to it. One of the leaders of this party was William Claiborne, who had established a trading-post on Kent Island, in the Chesapeake Bay, where, as the agent of a London firm of merchants, he dealt with the Indians for beaver skins. Baltimore was desirous of making a friend of Claiborne, and instructed Leonard, while notifying him that his island was within the province of Maryland, to make amicable overtures to him. Claiborne, however, preferred to remain an enemy.

A vessel of Claiborne's having been seized by the Maryland authorities for trading in Maryland waters without a license, he despatched a shallop with an armed party to St. Mary's to make reprisals. Calvert

sent out a force in two pinnaces to meet them, and a battle was fought on the Pocomoke river, in which there was some bloodshed on both sides, and Claiborne's vessel surrendered. Claiborne soon after went to England, and his London principals sent out an agent who took possession of their property on Kent Island and acknowledged the jurisdiction of Maryland. Some disaffection still remaining on the island, Governor Calvert sailed there with a small force, when all the residents peacefully submitted and were confirmed in their holdings of land.

Of the first meeting of the Maryland Assembly we have no record, but that of the second, in 1637–8, has been preserved. It consisted of all the freemen of the colony, present either in person or by proxies. This plan, however, proving inconvenient, was soon changed, and two burgesses were elected by every hundred, forming a lower house, while the Governor and Council, appointed by the Proprietary, constituted an upper house. The clause in the charter giving Baltimore the right to propose laws was waived by him, and the initiative in legislation left to the Assembly, he reserving the power of assent or dissent.

The missionaries sent out by the Jesuits with the first colonists were diligent in spreading Christianity among the Indians, who gladly listened to their teachings and embraced the faith; even the Tayac, or "emperor," as they called him, of Pascataway, who was a sovereign over several tribes, asking to be baptized and married according to the Christian rite; and he afterwards brought his young daughter to be educated at St. Mary's.

The peace which Maryland enjoyed for some years was disturbed by the civil war in England. Although Baltimore took no part in the war, he was known to be a friend of the King; and although Maryland had no direct interest in the controversy, much partisan feeling was aroused. In January, 1644, one Richard Ingle, commander of a merchant ship, was in St. Mary's, and being a violent partisan of Parliament, and a loose and loud talker of open treason, made himself so obnoxious that he was arrested, though presently released and suffered to sail away unmolested. But in the autumn of the same year he came back with an armed ship and a force of men, seized St. Mary's and overthrew the government. For two years the Province remained in the hands of Ingle and his men, joined by such of the baser sort as were lured by the prospect of plunder; and they pillaged and destroyed at their pleasure for about two years. No blood, however, seems to have been shed. Governor Calvert at length obtained some help from Virginia, and, returning with a force, regained his authority without a blow, and the Province was once more at peace. Not long after, on June 9, 1647, this just and humane Governor died, leaving a memory still dear to Marylanders.

In 1648, Baltimore sent out as governor William Stone, a Protestant and a friend of the parliamentary party; and at the same time reconstructed the Council, so as to give the Protestants a majority.

He also sent out a new great seal for the province. This seal bore a coat-of-arms, quartered, the first and fourth quarterings consisting of six pales, or vertical bars, alternately gold and black, crossed by a bend or diagonal stripe, on which the colors are reversed; and the second and third quarterings being themselves quartered red and white, and charged with a Greek cross, "counterchanged" (that is, red on the white ground and white on the red), with its limbs terminating in trefoils. The pales of gold and black are the original Calvert arms, and the crosses are the bearings of the Crossland family, Alicia Crossland having been George Calvert's mother. Above the shield is a palatine's cap, resembling an earl's coronet, and denoting the Proprietary's palatinate jurisdiction, and this is surmounted by a helmet bearing a ducal crown, from which spring two small banners, gold and black. As supporters he added a ploughman and a fisherman, and beneath was a scroll bearing the Calvert motto, "*Fatti Maschii Parole Femine.*" Surrounding the whole was the legend, "*Scuto bonae voluntatis tuae coronasti nos.*" (Ps. v. 12). This beautiful device still remains the seal and symbol of Maryland. Gold and black are the Maryland colors, and the escutcheon is displayed on the Maryland flag.


Baltimore's instructions to his first colonists, as we have said, forbade any discrimination on account of religious differences, or any disputes on matters of faith. In 1649 this policy was made law and placed on the statute-book in the famous "Toleration Act," as it is called. In this act the calling others by reproachful names on account of religious differences was forbidden under penalties, and "the better to preserve love and amity," it is enacted that "no person professing to believe in Jesus Christ shall be in any way molested or discountenanced for or in respect of his religion, nor in the free exercise thereof." This act remained the law of the land until the Puritan supremacy in 1652.

The Puritans came into Maryland in this way: In 1643 the Virginia Assembly passed a law expelling all non-conformists from the colony, upon which many came over to Maryland, where they were kindly received by the Proprietary, and wide and fertile lands in Anne Arundel county allotted them, which they joyfully accepted, and settling

about the Severn river, at or near the site of the present city of Annapolis, called their new home Providence.

After the execution of Charles I, the Virginia Assembly proclaimed his son, Charles II, as lawful King, in defiance of the statute which made such a declaration high treason. So Parliament sent out commissioners with a force to reduce to submission "the plantations within the Chesapeake Bay," thus including Maryland, where no opposition to Parliament existed. Under this authority Governor Stone was displaced, and William Fuller, a Puritan of Providence, with a body of commissioners, was put in possession of the government. These repealed the Toleration Act of 1649, and substituted an act visiting with penalties all adherents of "popery and prelacy," as well as Quakers, Baptists and other miscellaneous sects.

Cromwell was now all-powerful in England, and, disapproving of their doings, wrote to the Virginia commissioners commanding them to leave Maryland undisturbed. Baltimore then ordered Stone to take the government again. As Fuller refused to surrender it, Stone marched against him with the men of St. Mary's, and a battle was fought on the shore of the Severn on March 24, 1655, in which Stone's party were defeated and he himself wounded. The prisoners taken were condemned to death, and four of them were shot.

News of these violent proceedings reached Cromwell, and the whole matter was referred for final settlement to the Commissioners of Plantations, whose decision was favorable to Baltimore. Bennett and Matthews, the Virginia commissioners, then surrendered Maryland to the Proprietary, who re established his government with Josias Fendall as Governor.

Fendall had not been long in office when he entered into a plot to render himself independent of the Proprietary, and, indeed, to annul Baltimore's authority altogether; so he was superseded, and Baltimore's brother, Philip Calvert, appointed governor in his stead. The government was now established in the form which it retained until the Revolution. The Proprietary, in person or by deputy, was the chief executive, assisted by the Council. The Legislature sat in two Houses, the Governor and Council forming the Upper House, and the elected representatives of the freemen the Lower House. All legislation originated with the Assembly, subject to the Proprietary's assent. The form was, therefore, that of a liberal constitutional monarchy, with popular representation.

In 1651 Charles Calvert, only son of Cecilius, was sent out as governor. He was liked by the people, and the Province steadily grew and prospered under his administration. A firm treaty of peace was made with the Susquehannoughs, a warlike nation of Indians at the head of

the bay, and the native tribes of Maryland were taken under the protection of the government. Peace reigned throughout the province; and the only serious grievance of the colonists was the over-production of tobacco, which the government in vain tried to check. Money was excessively scarce; and the great staple, tobacco, was the general circulating medium for a hundred years or more.

Cecilius Calvert died in 1675, and Charles, third Baron of Baltimore, succeeded to his title and dominions. During his administration occurred a transaction which was to result in the loss to Maryland of a large part of her territory. The facts in brief are these: William Penn, to whose father's estate the crown owed a large sum, obtained from King Charles II, in lieu of payment, the grant of a tract of land west of the Delaware River and north of Maryland. There was nothing in this grant that encroached upon Maryland's territory, for the fortieth parallel was named in both charters as the southern boundary of the one and the northern boundary of the other. Penn, however, was extremely anxious to carry his southern boundary to the head of the Bay; and after many fruitless attempts to induce Baltimore to agree to a change of the boundary line to his advantage, refused to join him in fixing it, and so the line was left undetermined. He also obtained from the Duke of York (afterwards James II), a grant of the land bounding on the west side of the Delaware Bay, south to Cape Henlopen, land which the Duke had no power to convey, as it was already included in the Maryland charter. Of this also Penn kept a firm hold.

The Protestant revolution, as it was called, which dethroned James and gave the crown to William and Mary, strongly stirred men's minds, even in distant Maryland; and there were always ambitious and unscrupulous persons in the province ready to fan any spark of popular discontent to a blaze. Baltimore had sent out orders to have the new sovereigns proclaimed, but the messenger unfortunately died on the way, and the delay thence resulting was used to alarm the ignorant and timid. Although the Protestants outnumbered the Catholics eleven or twelve to one, the credulous people were easily persuaded that a plot was on foot to bring down a force of hostile Indians, who, joining with the Catholics, were to make a general massacre of the Protestants. The terrified people hastily took up arms in various places, and the leaders of the sedition, headed by John Coode, a man of infamous character, placed themselves at their head and seized the government. This done, they wrote to King William, assuring him that they had acted from motives of the purest patriotism, and to preserve the Protestants from destruction, and begging him to take the government into his own hand.

Accordingly William, without waiting for a legal investigation, assumed the government, and in 1692 sent out Sir Lionel Copley as the

first royal governor. The Proprietary's property and personal revenues were not confiscated, but the whole proprietary government was superseded.

One of the first acts of the new government was to make the Church of England the established church of the province. Hitherto all worship had been free, and all the churches had been supported by voluntary contributions, but now all taxables had to contribute, to the extent of forty pounds of tobacco per poll, to maintain the establishment. Protestant Dissenters and Quakers were allowed their separate meeting-houses, if they paid the tax.

The period of royal government was not marked by any momentous incident. During the administration of Francis Nicholson the seat of government was removed from St. Mary's to Annapolis (1694), and a beginning was made toward a system of free schools by the foundation of King William School, at the latter city.

Charles, the third Lord Baltimore, died in 1715, and his title and estates went to his eldest son, Benedict Leonard, who had become a Protestant. He, however, died the same year, and his son Charles, a minor, and also a Protestant, succeeded. As the charter had never been rescinded, but only held in abeyance because of the Proprietary's faith, that reason now no longer existed; and on the petition of Charles's guardian, the province was restored to him in 1716.

Little of moment occurred in the following years. In 1730 the town of Baltimore was laid out by commissioners appointed under an Act of Assembly, who bought a tract of sixty acres on the northwest branch of the Patapsco at forty shillings per acre, and laid it out in lots of about an acre each. The growth of the town was slow, and at the end of twenty years it had hardly more than as many houses. Annapolis, made the government seat by Governor Nicholson, was erected into a city in 1708. Frederick was laid out in 1745.

At this time the population of Maryland numbered about 94,000 whites. The annual export of tobacco was 28,000 hhds. and of wheat about 150,000 bushels.

In 1751 Charles, the Proprietary, died, and was succeeded by his only son, Frederick, sixth and last Baron of Baltimore, who sent out Horatio Sharpe as Governor.

In the final struggle between Great Britain and France for the possession of Canada, Maryland suffered severely by invasions of the French and Indians, and after Braddock's defeat in 1756, it seemed as if her western counties would be depopulated; but Governor Sharpe displayed great energy in the defence, and the transference of the seat of war to the St. Lawrence and the lakes removed the most imminent danger.

The stamp tax, imposed in 1765, met with violent opposition in Maryland, as it did everywhere, the stamp distributor being compelled to fly the province, and the stamps were shipped back to England, as no one would use them.

About this time the long-standing dispute about the northern boundary was finally settled, and two eminent English mathematicians, Charles Mason and Jeremiah Dixon, were engaged by the Proprietaries of Maryland and Pennsylvania to run the line between the provinces and mark it by suitable monuments. They began their labors in 1763 and continued them for four years. The line thus run is the famous Mason and Dixon's line, dividing the Northern from the Southern States.

Frederick, the sixth and last Baron of Baltimore, died in 1771, leaving the province to his illegitimate son, Henry Harford, a minor.

If the oppostion to the stamp tax had been fierce, that to the tea tax, first laid in 1767, was still fiercer, and associations were formed througout the province to prevent the introduction of tea. A firm of Annapolis merchants having, in defiance of the public sentiment, imported a consignment of that commodity, popular indignation rose so high that a town meeting was held, and the owner of the brig that had brought it, to avert further mischief, publicly burned his vessel, the *Peggy Stewart*, with its obnoxious cargo, in the sight of a large concourse of spectators, on October 19, 1774.

The associations were felt to embody the spirit of resistance to the tyrannous pretensions of England, but something more organic was seen to be necessary, if the struggle was to be carried on with any hope of success, and delegates were chosen to a Convention which met in Annapolis. This Convention became the depositary or organ of the sovereign power of the people of Maryland. It appointed the deputies to the Continental Congress, and instructed them from time to time. As it was too large to remain in permanent session, a portion of its members were appointed a Council of Safety, which sat in Annapolis, and was the executive organ of the Convention, assisted by committees of correspondence in the counties.

The Council of Safety soon began military preparations, organizing the militia and providing them with military stores and equipments. After the battle of Lexington the Convention prepared a declaration and pledge, declaring the purpose of the people to resist force by force, and warlike preparations went on rapidly. The militia was drilled and kept in readiness; minute-men were enlisted, and Maryland's contingent, known as the Maryland Line, placed at the disposition of Congress.

Governor Eden, finding that his presence in the colony was worse than useless, left the Province on June 24, 1776, and the last phantom of proprietary government vanished. Maryland was now a self-governed

republic; and the Convention emphasized the fact by issuing a formal Declaration of Independence on the third of July.

The Convention had always recognized itself to be a merely provisional government, uniting functions and powers which in a free State should be kept distinct. It therefore drew up a Bill of Rights and Constitution to be submitted to the people, and then abdicated its authority by a simple adjournment, leaving the direction of affairs in the hands of the Council of Safety; and thus the wisest and most patriotic body that ever governed Maryland ceased to exist.

The Constitution provided for a government consisting of a Governor and Council, a legislative body consisting of a Senate and House of Delegates, and other inferior executive officers. It was adopted by the people, and ratified at the elections. Thomas Johnson, the first elected Governor, was inaugurated in March, 1777, and the Council of Safety dissolved itself. Maryland thus became a sovereign and independent State, but she did not enter the Confederation until 1781, when she came in as the thirteenth and last State.

During the War of the Revolution no military operations of importance took place on the soil of Maryland, though the Maryland troops fought with distinguished valor in many engagements, especially those at Long Island, Camden, Cowpens, Guilford, and Eutaw Springs. Baltimore was threatened early in the war with a naval attack, but the Baltimoreans had fitted out an armed ship, the *Defence*, and on her approach the enemy retired without doing any injury.

After the successful close of the war, General Washington resigned his commission to Congress in the Senate Chamber of the State-house, at Annapolis, on December 22, 1783.

In 1791 Maryland ceded to the United States the present District of Columbia to be the permanent seat of the Federal Government.

In the war of 1812 with Great Britain, Maryland bore a distinguished part. The number of privateers that sailed from Baltimore, and their efficiency in crippling British commerce, drew upon her the especial wrath of the enemy, whose cruisers depredated the towns and settlements on the shores of the Bay. In August, 1814, an expedition under General Ross, marching through Maryland to the attack of Washington, was met at Bladensburg by a force, chiefly of Marylanders and Virginians, and the Americans sustained a severe defeat and retreated, leaving the way open to Washington, which was plundered and the public buildings burned.

In the following month a formidable force was sent to attack Baltimore by land and water. The approach to the city was defended by Fort McHenry and several hastily constructed batteries, and on the land side by earthworks. Part of the enemy's forces were disembarked at

North Point at the mouth of the Patapsco, but on the march toward the city they were met by a detachment of Maryland forces under General Stricker, and a skirmish followed on September 12, in which General Ross, the British commander, was killed; the Marylanders retiring in good order. This was called the battle of North Point; and the Battle Monument, as it is called in Baltimore, preserves the names of those who fell in defence of the city.

The British forces continued their march until they reached the defenders' lines, when they halted, awaiting the co-operation of the fleet. This was checked in its advance by Fort McHenry at the mouth of the harbor, which was fiercely bombarded for a day and night without effect, and an attempt to land men in boats was repulsed with heavy loss by the batteries. As the combined attack on the city was thus frustrated, the plan was abandoned. The patriotic song, "The Star-spangled Banner," was written on this occasion by Mr. Francis Scott Key, a Marylander, who had gone on board the British Admiral's ship with a flag of truce, and was detained on board during the bombardment. Peace with Great Britain was concluded in December.

For nearly fifty years after the peace, the history of Maryland is a story of peaceful prosperity. Canals and railroads were constructed, developing the internal resources of the State, the most important being the Baltimore and Ohio Railroad, work on which was begun in 1828.

The outbreak of the war between the States in 1861 found the people of Maryland divided in sentiment, though the greater number strongly sympathized with the sister States of the South. A Massachusetts regiment marching through Baltimore on its way to Washington was pelted with stones by a mob, and fired into the people, several persons being killed on both sides. The city and State, however, were soon under control of the Federal forces.

No considerable battle was fought on Maryland soil during the war, except that of Sharpsburg, in Washington county, on September 16 and 17, 1862, and she was thus spared the devastation which follows the track of hostile armies.

With the restoration of peace and civil government, Maryland again entered upon a career of prosperity, the material results of which will appear in the following pages. The emancipation of the slaves altered, of course, many of the conditions of industry; but as she had been less dependent on slave labor than the more Southern States, its cessation did not leave her paralysed. The agricultural interests suffered for a time; but on the whole the change has been beneficial. The greater efficiency of hired labor, and its comparative scarcity, has driven the farmers to more scientific and economical farming, to the abandonment of old routine and traditional methods and crops, and to the higher cultivation of smaller areas, as will be explained in a future chapter.

# CHAPTER II.

## PHYSICAL FEATURES.

The prosperity of a country is, to a large degree, dependent upon its physical surroundings. Their character determines the pursuits of its inhabitants, and thus, indirectly, their social, political and financial welfare. The residents of a mountainous district have their peculiar occupations, while those of the lowland find their employment in other ways. If the region borders the sea or inland bodies of water still other means of livelihood are sought by its people. The climate, whether hot or cold, humid or dry, variable or constant, likewise affects the development of the region. It becomes important, therefore, to know something of the physical features of a country or a State if one would understand its past history or indicate the lines of future prosperity.

When we come to examine the physical features of the State of Maryland we find the greatest diversity in surface configuration and climate. From its eastern to its western borders may be found a succession of districts suitable, from their physical surroundings, for the most diverse employments. Maryland possesses portions of all the characteristic divisions of the eastern United States. There is no State in the country which has a greater variety in its natural surroundings.

In the succeeding pages of this chapter the Physical Features will be considered under the four following headings, viz: Topography, Climate, Water Supply and Water Power.

### TOPOGRAPHY.

The topography, or surface configuration of the State, will be best understood after a brief account of the leading features of the eastern United States, since Maryland is only a portion of a larger and definite topographic region. An examination of a relief map of the United States shows a gradual elevation east of the Mississippi Valley to the great mountainous area bordering the eastern side of the continent, beyond which the country slopes at first rapidly, then gradually, to the Atlantic coast.

The mountainous area is known under the name of the *Appalachian Region,* while the hilly country which stretches along its eastern base has been called the *Piedmont Plateau.* To the east of the latter and

occupying the region bordering the Atlantic coast is a low, level area which has been termed the *Coastal Plain*.

A brief characterization of these leading topographic divisions of the eastern United States will precede a more detailed description of the Maryland area.*

The Coastal Plain, as a continuous tract, begins in New Jersey on the south shore of Raritan Bay, where it has a width of about 20 miles, and extends thence southward, constantly broadening, until, in Georgia, it reaches fully 150 miles. North of New Jersey it is continued in the islands of Long Island, Martha's Vineyard, and Nantucket, and other land areas bordering the New England coast.

The Coastal Plain is characterized by broad, level stretches of slight elevation, cut by the larger rivers that flow across the area from the Piedmont Plateau, and the smaller rivers and tributaries that have their sources within it. All the streams have sluggish currents, and the drainage of the land is imperfect. Throughout, the country is deeply indented with tidal estuaries and bays, the heads of which often reach quite to the border of the Piedmont Plateau, and at many points admit the entrance of the largest ocean-going vessels.

The deeper channels are generally the continuation of the leading rivers which suddenly change in character as they enter the Coastal Plain, with great loss in the velocity of their currents. The name "fall-line" has been given to this boundary on that account. The inland border of the Coastal Plain thus marks the head of navigation, and has likewise conditioned, from the earliest times, the leading highways of trade which connect the North and the South. Along this line have grown up the larger cities of the Atlantic seaboard. Trenton, Philadelphia, Baltimore, Washington, Richmond, Petersburg, Columbia, Augusta, together with other less populous centres, are thus situated.

To the west of the Coastal Plain, and extending to the base of the mountainous area, is a region of somewhat greater elevation than that which has just been described. It is known under the name of the Piedmont Plateau.

To the north, in New England, it is less clearly defined than along the Middle and South Atlantic slope, where it occurs as a broken, hilly country, with undulating surface, but with few ranges of mountains of conspicuous altitude or great extent. It broadens from New York southward, reaching its greatest width in North Carolina, where it extends quite 300 miles from the base of the Appalachian Mountains. Through-

*See Whitney, J. D., United States. Physical Geography and Geology. Encyclopædia Britannica. vol. XXIII, pp. 791-802.
McGee, W. J., Three Formations of the Middle Atlantic Slope. Amer. Jour. Sci., 3d ser., vol. 35, pp. 120-124.

out most of the Piedmont Plateau the streams flow with rapid currents, and the country is fully drained.

The area of high land, known as the Appalachian Region, extends from Cape Gaspé, in Canada, southward to Alabama, a distance of 1,300 miles. To the south of New York it is divided into three more or less clearly defined regions.

The eastern district is composed of ranges of mountains called in Pennsylvania the South Mountains, but known in Maryland, Virginia and North Carolina under the name of the Blue Ridge. South of Virginia the eastern belt increases in width, and somewhat changes its character, and in North Carolina contains the highest points in the whole Appalachian system. On the western border of the Blue Ridge lies the Great Valley, which, in Pennsylvania, is about 10 miles in width, but broadens southward, attaining in Virginia, for a distance of 300 miles, a nearly uniform width of 20 miles. It forms one of the richest agricultural belts within the Appalachian Region.

The central district is known as the Appalachian Region proper, and is characterized by parallel ranges throughout the whole length of the mountainous area. The continuity of the ranges is frequently interrupted from structural and other causes, but sharp ridges and deep valleys everywhere abound.

The western district is characterized by undulating ranges which rise from a high plateau that gradually decreases in elevation westward, until it merges into the rolling country of the Mississippi Valley. Along the eastern side of this western area of highland are the Alleghany Mountains. They continue as parallel ranges throughout the region, which is commonly known as the Alleghany District.

After this review of the leading topographic features of the Eastern United States, let us turn our attention to a consideration of the Maryland area.

The three regions which have been outlined above, viz: The Coastal Plain, the Piedmont Plateau and the Appalachian Region, are all typically represented within the limits of the State of Maryland, and have conditioned, to a marked extent, its economic development.

### THE COASTAL PLAIN.

The Coastal Plain forms the eastern portion of the State, and comprises the area between the Atlantic Ocean, and a line passing N. E. to S. W., from Wilmington to Washington, through Baltimore. This region includes very nearly 5,000 square miles, or, approximately, one-half the area of the State. It is about 100 miles broad in its widest part.

The Coastal Plain is characterized by broad, level-topped stretches of country which extend, with gradually increasing elevations, from the

coastal border, where the land is but slightly raised above sea level, to its western edge, where heights of 300 feet and more are found. As the region is cut quite to the border of the Piedmont Plateau with tidal estuaries, the topography becomes more and more pronounced in passing inland from the coast. The Chesapeake Bay extends nearly across its full length from north to south, while the larger rivers and their tributaries deeply indent the region in all directions, making the coast-line in Maryland one of the longest in the country.

The Coastal Plain in Maryland may be divided into a lower eastern and a higher western division, separated by the Chesapeake Bay. The former is known under the name of Eastern Maryland (or Eastern Shore), while the latter is commonly referred to as Southern Maryland.

The *eastern division* includes the counties of Worcester, Somerset, Wicomico, Dorchester, Caroline, Talbot, Queen Anne, Kent, and part of Cecil. To this region most of the State of Delaware also properly belongs. Nowhere, except in the extreme north, does it reach 100 feet in elevation, while most of the country is below 25 feet in height. Both on the Atlantic coast and the shore of the Chesapeake, it is deeply indented by bays and estuaries.

The drainage of the region is simple, the streams flowing from the watershed directly to the Atlantic Ocean and Delaware Bay upon the east, and to the Chesapeake Bay upon the west. The position of the watershed, along the extreme eastern edge of the area, is very striking. In Worcester county, for much of the distance, it is only a few miles from the coast. As a result, the streams which flow to the east are small in comparison to those which drain to the west. Among the more important rivers which reach the Chesapeake Bay are the Pocomoke, Nanticoke, Choptank and Chester, which all have their headwaters within the State of Delaware, and flow in a general southwest direction in sinuous channels.

The *western division* includes the counties of St. Mary's, Calvert, Charles, Prince George's, Anne Arundel, and portions of Baltimore, Harford and Cecil. In elevation it stands in striking contrast to the eastern division, since it frequently exceeds 100 feet in height, even along its eastern margin. In lower St. Mary's county the land reaches an elevation of 100 feet not far from the bay shore, which is gradually increased until, near the border of Charles county, it slightly exceeds 180 feet. In southern Calvert county an elevation of 140 feet is found to the west of Cove Point, and this gradually increases to the northward, until near the southern boundary of Anne Arundel county, the land rises above 180 feet. Farther to the northwest, in Charles, Prince George's and Anne Arundel counties, the land increases gradually

in height, reaching 280 feet to the east of Washington, and this is continued with slight decrease to the northeastward toward Baltimore.

The western division is traversed by several rivers which flow from the Piedmont Plateau. Among the more important are the Potomac, Patuxent, Patapsco, Gunpowder and Susquehanna. The course of the Potomac is very striking. After flowing in a nearly southeast direction, across the hard rocks of the Piedmont Plateau, it is, apparently, abruptly turned aside by the soft materials of the Coastal Plain, and takes a course for forty miles nearly at right angles to that which it has formerly held. It turns again as abruptly to the southeast, and flows in that direction to the Chesapeake Bay.

The local drainage of the western division is similar to that hitherto described for the eastern. The streams throughout southern Maryland flow chiefly to the westward. The water-shed of the region lying between the Chesapeake Bay and the Patuxent River is situated but a short distance from the shores of the latter, most of the natural drainage of Calvert county reaching the Patuxent River. A still more striking instance of this is seen in St. Mary's, Charles and Prince George's counties, where the streams nearly all flow to the Potomac River, the water-shed of the region approaching very close to the valley of the Patuxent. The same peculiarity of drainage is found to the southward, in Virginia and the Carolinas.

### THE PIEDMONT PLATEAU.

The Piedmont Plateau borders the Coastal Plain upon the west, and extends to the base of the Catoctin Mountains. It includes, approximately, 2,500 square miles, or about one-fourth of the area of the State. It is nearly forty miles in width in the southern portion of the region, but gradually broadens toward the north, until it reaches 65 miles. It includes all, or the greater part of Montgomery, Howard, Baltimore, Harford, Carroll and Frederick counties. The country is broken by low, undulating hills, which gradually increase in elevation to the westward.

The Piedmont Plateau in Maryland, is divided very nearly in its central portion by an area of highland known as Parr's Ridge, into an eastern and western district. In the character of the rocks these divisions afford sharp distinctions, which are not without their effect upon the relief of the land.

The *eastern division* has, on account of its crystalline rocks and their complicated structure, a diversified topography. Along the eastern margin the land attains, at several points, heights exceeding 400 feet, reaching at Catonsville 525 feet above sea level. To the west the country gradually increases in elevation, until it culminates in Parr's Ridge, which exceeds 850 feet in Carroll county.

The drainage of the eastern district is to the east and southeast. On its northern and southern boundaries it is traversed by the Susquehanna and Potomac rivers, which have their sources without the area, while the smaller streams, which lie between them, either drain directly to the Chesapeake Bay, or into the two main rivers. Among the larger of the intermediate streams are the Patuxent, Patapsco and Gunpowder rivers, whose headwaters are situated upon Parr's Ridge. The Patapsco, especially, flows in a deep rocky gorge until it reaches the Relay, where it debouches into the Coastal Plain. All these streams have rapid currents as far as the eastern border of the Piedmont Plateau, and even in the case of the largest, are not navigable.

The broad, fertile limestone valleys are a striking feature in this area, and are represented to the north of Baltimore in the Green Spring and Dulaney's valleys. On account of the complicated character of the stratigraphy, the valleys take different directions, and are of different form and extent.

The *western division* extends from Parr's Ridge to the Catoctin Mountains. Along its western side is the broad limestone valley in which Frederick is situated, and through which flows the Monocacy River from north to south, entering the Potomac River at the boundary line between Montgomery and Frederick counties. The valley, near Frederick, has an elevation of 250 feet above tide, which changes slowly to the eastward toward Parr's Ridge, and very rapidly to the westward toward the Catoctin Mountains. Situated on the eastern side of the valley, just above the mouth of the Monocacy River, and breaking the regularity of this surface outline is Sugar Loaf Mountain, which rises rapidly to a height of 1,250 feet.

With the exception of a few streams which flow into the Potomac directly, the entire drainage of the western district is accomplished by the Monocacy River and its numerous tributaries, which flow in nearly parallel west and east courses, from Parr's Ridge and the Catoctin Mountains. As the deepest portion of the valley lies considerably to the west of the centre of the district, the streams upon the east are longer and of greater volume than those upon the west. The water-ways at a distance from the main valley, flow in well-marked channels, which are frequently deeply cut into the land.

## THE APPALACHIAN REGION.

The Appalachian Region forms the western portion of Maryland, bordering the Piedmont Plateau. It comprises about 2,000 square miles, or, approximately, one-fifth the area of the State. It includes the western portion of Frederick, and all of Washington, Alleghany and Garrett counties. It consists of a series of parallel mountain ranges

with deep valleys, which are cut nearly at right angles by the Potomac River. Many of the ranges exceed 2,000 feet, while some reach 3,000 feet and more, in the western portion of the mountainous area.

The Appalachian Region is divided into three distinct districts, an eastern (Blue Ridge and Great Valley), a central (Appalachian Mountains proper) and western (Alleghany Mountains), which are separated from one another upon clearly defined structural differences.

The *eastern division* comprises the area between the Catoctin and the North Mountains, and has a width of about 25 miles from east to west. Along the eastern border of this region the Catoctin Mountains extend from north to south, reaching the Potomac river at Point of Rocks. They attain an altitude of 1,800 feet. Succeeding this range upon the west is the Middletown Valley, with an elevation of 500 feet at Middletown. Running through its centre from north to south is the Catoctin Creek, which receives the drainage from the western flanks of the Catoctin Mountains and the eastern slope of the Blue Ridge. The Blue Ridge Mountains are a continuation of the South Mountains of Pennsylvania, and extend as a sharply defined range from the northern boundary of the State to the Potomac river, which they reach at Weverton. Their crest forms the boundary between Frederick and Washington counties. The Blue Ridge reaches an elevation of about 2,400 feet at Quirauk. The Blue Ridge of Virginia is not the direct continuation of the mountains so named in Maryland, but of a smaller range, the Elk Ridge Mountains, that adjoin them upon the west. They are pierced by the Potomac river at Harper's Ferry.

Occupying the greater part of this eastern district, and reaching to its western border, is the Hagerstown Valley, a portion of the Great Valley of the Appalachian Region hitherto described. It reaches an altitude of about 500 feet at Hagerstown, but gradually becomes lower toward the south in the vicinity of the Potomac river. The Antietam River and its tributaries occupy the eastern side of the valley, and the Conococheague River and its tributaries the western. The central portion of the valley is accordingly somewhat higher than its sides.

The *central division*, which comprises the Appalachian Mountains proper, is bounded by the North Mountain upon the east and Will's Mountain, near Cumberland, upon the west. Prof. H. D. Rogers describes this district as follows in his report of the First Geological Survey of Pennsylvania: "It is a complex chain of long, narrow, very level mountain ridges, separated by long, narrow, parallel valleys. These ridges sometimes end abruptly in swelling knobs, and sometimes taper off in long slender points. Their slopes are singularly uniform, being in many cases unvaried by ravine or gully for many miles; in other instances they are trenched at equal intervals with great regularity.

Their crests are, for the most part, sharp, and they preserve an extraordinarily equable elevation, being only here and there interrupted by notches or gaps, which sometimes descend to the water level, so as to give passage to the rivers [Potomac]. . . . . The ridges are variously arranged in groups with long, narrow crests, some of which preserve a remarkable straightness for great distances, while others bend with a prolonged and regular sweep. In many instances two narrow contiguous parallel mountain crests unite at their extremities and enclose a narrow oval valley, which, with its sharp mountain sides, bears not unfrequently a marked resemblance to a long, slender, sharp-pointed canoe." Among the more important of the ranges in Maryland west of North Mountain are Tonoloway Hill, Sideling Hill, Town Hill, Green Ridge, Warrior Ridge and Martin's Ridge, the two latter reaching 2,000 feet and upwards in elevation. They are arranged in groups of three parallel and closely adjoining ridges on the east and west, with more distant ranges in the middle of the district.

The drainage is altogether to the southward into the Potomac. The deeper valleys in the eastern portion of the region have an elevation of about 500 feet in the vicinity of the Potomac, but they gradually became higher toward the west. Evett's Creek, at its mouth, near Cumberland, has an elevation of about 600 feet above sea level.

The *western division* occupies the extreme western portion of Maryland, and includes the Alleghany Mountains in its eastern half. They gradually merge into a high plateau, with gently undulating mountains rising from the surface, which continue beyond the western borders of the State. The leading ranges of this district are Dan's Mountain, Savage Mountain, Meadow Mountain, Negro Mountain, Winding Ridge and Laurel Hill. Heights of 3,000 feet and more are reached in Savage and Negro Mountains.

The partially-adjusted streams give much variety to the topography. They flow in part to the southward into the Potomac, but in Garrett county the greater number drain to the northward through the Youghiogheny River into the Monongahela.

This separation of the drainage has particular interest, since it marks the water-shed between the streams which flow into the Potomac and thus reach the sea by the eastern slope of the Appalachian Mountains, and those which flow to the Gulf by way of the Ohio and Mississippi Rivers.

## CLIMATE.

The climate of Maryland is greatly diversified by reason of the complexity of its surface configuration, the presence of the sea upon its eastern borders, the great area of highland which occupies the western division, and the bays and estuaries which deeply indent the land in all

directions in the Chesapeake region. On account of these disturbing conditions, the same parallels of latitude show very great variations in the character of the climate.

Although the climate in general is what is known as continental, it is greatly modified in the eastern portion of the State by the ocean and the Chesapeake Bay, and in the extreme southeast becomes almost oceanic or insular, surrounded as the land is on nearly all sides by water.

A description of the climate of the State has been rendered possible as a result of the extended observations of the Maryland State Weather Service, which was organized two years ago, under the joint auspices of the Johns Hopkins University, the Maryland Agricultural College and the United States Weather Bureau, and was recognized by the Legislature of the State at its last session. Over fifty stations have been established in the several counties, so that every important variation which takes place within the limits of the State may be observed. Many records of temperature and rainfall were kept at isolated points throughout the State before the organization of the State Service, and these, together with the fuller and more accurate observations which have been taken during the last two years, afford the data upon which the conclusions of this chapter will be based.

The climate of the State will be considered under the following heads, viz:—Temperature, Precipitation, Humidity, Winds, Barometric Pressure, Medical Climatology.

TEMPERATURE.

The great diversity in the physical features of Maryland, with its consequent effect upon the climate, renders a characterization of the temperature of the State, as a whole, quite impossible. The difference between the coastal portions and the mountainous regions is so great that the monthly, seasonal and annual means for the State do not of necessity indicate the temperature for any single locality, although they are of interest in making comparisons with other areas. The following table of mean temperatures of the State is made up from all the localities which are mentioned in the later lists, and includes all the authentic observations:

TABLE OF MEAN TEMPERATURE FOR MARYLAND.

| Monthly Mean. | | | | | | | | | | | | Seasonal Mean. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Spring. | Summer. | Autumn. | Winter. | Annual Mean. |
| 32.8 | 34.8 | 39.6 | 51.7 | 62.6 | 72.5 | 75.8 | 74.3 | 66.9 | 54.7 | 44.0 | 35.5 | 51.2 | 74.0 | 55.0 | 34.4 | 53.8 |

Upon an examination of the table it will be observed that the coldest month is January, with an average mean temperature of 32.8°, while the warmest month is July, with an average mean temperature of 75.8°, a difference of 43°. The greatest changes in mean temperature take place in the Spring and Autumn months, while those in Summer and Winter are very slight.

Since the temperature is modified to a marked degree by altitude and proximity to the sea, the State of Maryland will naturally fall into the four following divisions, the topographic features of which have been already described, viz:

$\left.\begin{array}{l}\textit{Eastern Maryland}\\ \textit{Southern Maryland}\end{array}\right\}$ *=Coastal Plain.*
*Northern Central Maryland=Piedmont Plateau.*
*Western Maryland=Appalachian Region.*

An examination of the following tables will show the differences in temperature which are found in the several districts. Since Eastern Maryland extends much farther north than Southern Maryland its mean temperature is lower, although it is generally warmer at the same latitude:

TABLE OF MEAN TEMPERATURE FOR THE FOUR CLIMATIC DIVISIONS OF MARYLAND.

| Climatic Divisions. | January. | February. | March. | April. | May | June. | July | August | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Maryland. | 34 8 | 36.1 | 40.5 | 52 6 | 62.1 | 72 8 | 75.8 | 74.8 | 67.5 | 56.5 | 55 3 | 37.8 |
| Southern Maryland | 35.3 | 37.4 | 42.3 | 53 4 | 63.9 | 74 1 | 77.7 | 75.7 | 68.6 | 56.6 | 46.5 | 37.6 |
| Northern Central Maryland | 30.7 | 33.9 | 38.2 | 50.9 | 63 5 | 72.8 | 75 7 | 72 4 | 65 8 | 54 2 | 42 8 | 34.0 |
| Western Maryland | 30 5 | 31.6 | 37.2 | 49.8 | 60 7 | 70 8 | 73.8 | 74.2 | 65.8 | 51 4 | 41.2 | 33.0 |

| Climatic Divisions. | Seasons. | | | | Year. | Seasonal Changes. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Spring. | Summer. | Autumn. | Winter. | | Winter to Spring. | Spring to Summer. | Summer to Autumn. | Autumn to Winter. |
| Eastern Maryland | 51.7 | 74.5 | 55.8 | 36.1 | 54.5 | 15.6 | 22.8 | -18.7 | -19.7 |
| Southern Maryland | 53.1 | 75.5 | 57.2 | 36.9 | 55.6 | 16.2 | 22.4 | -18.3 | -20.3 |
| Northern Central Maryland | 50.6 | 73.5 | 54.3 | 33 1 | 53.0 | 17.5 | 22.9 | -19.2 | -21.2 |
| Western Maryland | 49.4 | 72.7 | 52.7 | 31.7 | 52.0 | 17.7 | 23.3 | -20.0 | -21 0 |

It will be observed that the mean annual temperature of the western division is 52°, while that of the southern is 55.6°, a difference of 3.6°. The mean annual temperature has a much greater range, however, when the extremities of the State are compared. An examination of Plate VI will show the isothermal line of 50° passing through Garrett and Alleghany counties and bending down along the high ridge of the Piedmont Plateau into Carroll and Baltimore counties, while the isothermal line of 58° crosses Worcester and Somerset counties to the Virginia shore of the Chesapeake. There is thus a difference of over 8° in the annual means between the northern and western, and the southern portions of the State.

The seasonal isothermal lines upon the charts indicate a still wider range in mean temperature between the western and southeastern portions of the State. In spring it ranges from 56° to 44°, a difference of 12°; in summer from 77° to 69°, a difference of 8°; in autumn from 60° to 50°, a difference of 10°; and in winter from 40° to 27°, a difference of 13°.

On Plate I will be found a graphic representation of the annual range of temperature in the four climatic divisions. The vertical lines represent the months, and the horizontal the degrees of temperature, while the curved lines indicate the climatic divisions. Each intersection of a vertical line by a curved line marks the mean temperature for the month. The rapid changes in spring and autumn, and the relatively slight changes in summer and winter, are clearly brought out by this means.

*Eastern Maryland.* This portion of the State has been hitherto designated as the eastern division of the Coastal Plain, and its low level surface described. Deeply indented by tidal estuaries and bordered by the ocean, its temperature is much modified by the surrounding water.

The southern portion of the area has a mean annual temperature of 58°, the highest in the State. In passing to the northward the temperature changes at first rapidly, the isothermal lines of 57° and 56° following at short intervals. The greater portion of the eastern division, however, is found between the isothermal lines of 56° and 54°, while in the extreme north the temperature again changes rapidly, the isothermal lines of 53° and 52° following each other at short intervals. The extreme range in the mean annual temperature is thus found to be 6°.

The mean seasonal variations between the southern and northern portions of the region are also distinctly marked. As in the case of the annual means, the isothermal lines do not succeed each other in all instances at regular intervals.

The mean temperature for spring ranges from 50° in the north to 56° in the south. An examination of Plate II will show, however, that the greater portion of the region is found between the means of 51° and 53°.

In summer there is very little range in mean temperature between the northern and southern portions of the district. The entire region lies between the isothermals of 74° and 76°.

In autumn the range in mean temperature is the same as in spring, amounting to 6°. Although the extremes are found between 54° and 60°, the greater portion of the region lies between 55° and 57°.

The greatest difference in mean temperature is found in winter. The variation is then 9°, and the mean temperature ranges from 31° in the north to 40° in the south. There is a much more gradual change than at other seasons, the isothermals being found approximately equidistant from one another.

Reference to the tables will show the names and number of the stations in Eastern Maryland, together with the local monthly and seasonal variations in mean temperature which occur.

*Southern Maryland.* The southern portion of the State has been already described as the western division of the Coastal Plain. The surface of the land is somewhat higher and more broken than in Eastern Maryland, but is still low and flat. On account of this general uniformity throughout the area, together with its limited extent from north to south, the variations in mean temperature are not very striking. The annual means seldom exceed that of Baltimore, which is 55.6°, by more than 2°, while Leonardtown and several other places have almost the same average temperature. At a few points, owing to local causes, the mean annual temperature is even lower.

With the exception of the winter temperature, the mean seasonal temperatures show very slight variations, seldom reaching more than two degrees. In spring the region is crossed by the isothermal lines of 53° and 54°, in summer of 75°, 76° and 77°, in autumn of 57°, 58°, 59° and 60°, the two latter, however, only touching the southern portion of St. Mary's county. In winter, on the other hand, variations of four or five degrees are found, the isothermal lines of 36°, 37°, 38°, 39° and 40° succeeding one another at very nearly equal intervals.

The interior portion of the country is warmer during the spring, summer and autumn months, but cooler during the winter.

The names and number of the stations in Southern Maryland are given in the following tables.

*Northern-Central Maryland.* The hilly country which borders the Coastal Plain upon the east, has been already described under the name of the Piedmont Plateau. It is here referred to under the name of Northern-Central Maryland. The rapid streams, and moderate though complex relief of the land, have been mentioned as characteristic features of the area.

The mean annual temperature of the region ranges from 50° to 55°. The coldest portions are found along the higher land of the Piedmont belt, which culminates in Parr's Ridge. The Frederick valley is considerably warmer, corresponding in this respect to the eastern slope in Montgomery and Howard counties.

The mean seasonal temperatures have the same general relations to the topography as the annual temperatures. The high, central portion of the Piedmont area is at all seasons several degrees colder than the eastern slope or the Frederick valley. The spring means vary from 48° to 53°, the summer from 69° to 75°, the autumn from 52° to 57°, and the winter from 29° to 36°, which indicates a slightly greater range in temperature in the winter and summer than in the spring and autumn.

The names and number of stations will be found in the tables which follow.

*Western Maryland.* The portion of the State which is here considered under the name of Western Maryland, has been previously described as the Appalachian Region. It consists of parallel ranges of mountains, with deep valleys, which drain chiefly into the Potomac River. The mountains reach 3,000 feet and more in altitude, and in the west rise from a high plateau, which declines gradually beyond the limits of the State.

As might be anticipated, there is on this account a general lowering of the temperature throughout the entire district.

So far as conclusions can be drawn from the records of temperature, which are not altogether satisfactory, the valleys are warmer than the mountains. This is best seen in the Hagerstown valley, where the isothermals invariably bend to the westward. In the smaller valleys few continuous observations have been taken, while, practically, none are recorded from the mountains, with which comparisons may be made.

There is a slight decrease in the mean annual temperature in passing from the eastern to the western portions of the region. The range is from 50° to 53°, making a difference of 3°.

This is shown more distinctly in the case of the seasonal means, particularly in the spring and winter. In the spring the mean temperature varies from 44° to 52°; in summer, from 70° to 75°; in autumn, from 50° to 54°; in winter, from 27° to 34°, which shows a greater variation in spring and winter than in summer and autumn.

The names and number of the stations are shown in the accompanying tables:

## Table of Mean Temperatures—Monthly.

| | Stations. | Latitude. | Longitude. | Altitude—feet. | January. | February. | March. | April. | May | June. | July. | August. | September. | October. | November. | December. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastern Maryland. | | | | | | | | | | | | | | | | |
| 1 | Princess Anne, Somerset County.... | 38° 12′ | 75° 41′ | 20 | 38.3 | 39.7 | 47.6 | 56.1 | 64.6 | 72.6 | 77.6 | 76.2 | 69.8 | 57.2 | 49.3 | 41.4 | 1 |
| 2 | Barron Creek Springs, Wicomico Co. | 38° 28′ | 75° 45′ | 25 | 39.5 | 39.0 | 40.2 | 53.0 | 63.3 | 73.1 | 74.1 | 74.8 | 67.1 | 54.2 | 46.8 | 38.9 | 2 |
| 3 | Federalsburg, Caroline County...... | 38° 41′ | 75° 46′ | 34 | 33.7 | 40.0 | 42.7 | 48.8 | 58.1 | ...... | ...... | ...... | ... | 63.0 | 47.9 | 41.3 | 3 |
| 4 | Denton, Caroline County........... | 38° 53′ | 75° 50′ | 42 | 24.5 | 36.0 | ...... | ...... | ...... | ...... | ...... | ...... | ... | ..... | 44.1 | 33.1 | 4 |
| 5 | Isthmus, Talbot County............ | 38° 45′ | 76° 15′ | 20 | ...... | ...... | ..... | 54.6 | ...... | ...... | 78.4 | 77.8 | ..... | 58.2 | ..... | 40.2 | 5 |
| 6 | Easton, Talbot County.... ........ | 38° 46′ | 76° 5′ | 35 | 34.0 | 38.0 | 39.0 | 54.0 | 64.8 | 76.1 | 76.6 | 76.2 | 65.1 | 56.4 | 43.6 | 36.6 | 6 |
| 7 | Chestertown, Kent County.......... | 39° 13′ | 76° 4′ | 80 | 32.3 | 33.2 | 42.2 | 50.6 | 62.6 | 71.7 | 76.2 | 74.6 | 67.8 | 55.6 | 45.6 | 36.0 | 7 |
| 8 | Galena, Kent County...... ........ | 39° 20′ | 75° 52′ | 30 | 39.6 | 35.7 | 41.0 | 54.4 | 64.8 | 74.5 | 75.8 | 72.6 | 65.6 | 51.9 | 47.1 | 39.4 | 8 |
| 9 | Elkton, Cecil County.............. | 39° 36′ | 75° 50′ | 40 | .... | ...... | ...... | ...... | ...... | ...... | 70.7 | ...... | ..... | ..... | ..... | ..... | 9 |
| 10 | Woodlawn, Cecil County............ | 39° 39′ | 76° 4′ | 100 | 29.8 | 31.0 | 38.2 | 50.4 | 61.0 | 71.6 | 75.4 | 72.5 | 66.2 | 53.4 | 41.6 | 32.1 | 10 |
| 11 | Del. Breakwater, Sussex Co., Del.... | 38° 48′ | 75° 10′ | 20 | 32.8 | 36.9 | 40.4 | 48.1 | 59.7 | 68.2 | 73.2 | 72.4 | 69.9 | 60.8 | 47.5 | 38.2 | 11 |
| 12 | Milford, Kent County, Del ......... | 38° 55′ | 75° 25′ | 20 | 36.1 | 34.7 | 42.0 | 51.3 | 60.5 | 72.3 | 76.0 | 73.7 | 64.9 | 53.5 | 42.4 | 36.8 | 12 |
| 13 | Dover, Kent County, Del........... | 39° 10′ | 75° 30′ | 40 | 34.8 | 36.0 | 41.6 | 53.0 | 63.8 | 73.1 | 77.2 | 75.0 | 67.2 | 60.8 | 44 2 | 35.9 | 13 |
| 14 | Fort Delaware, Newcastle Co., Del.. | 39° 35′ | 75° 34′ | 10 | 32.2 | 33.8 | 40.1 | 57.6 | 60.5 | 72.8 | 77.6 | 75.6 | 69.6 | 57.3 | 45.9 | 37.7 | 14 |
| 15 | Kirkwood, Newcastle County, Del... | 39° 35′ | 75° 41′ | 40 | 34.7 | 35.1 | 37.0 | 51.5 | 62.0 | 74.8 | 76.8 | 75.7 | 68.6 | 52.3 | 42.7 | 35.1 | 15 |
| | Sums................ ...... | ......... | ..... | ...... | 417.8 | 433.1 | 527.0 | 683.4 | 745.7 | 800.8 | 985.6 | 897.1 | 742.4 | 734.6 | 588.7 | 522.7 | |
| | Means...................... | ......... | ..... | ...... | 34.8 | 36.1 | 40.5 | 52.6 | 62.1 | 72.8 | 75.8 | 74.8 | 67.5 | 56.5 | 45.3 | 37.3 | |

## TABLE OF MEAN TEMPERATURES—MONTHLY.

| STATIONS | Latitude. | Longitude. | Altitude—feet. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTHERN MARYLAND. | | | | | | | | | | | | | | | | |
| 16 Ridge, St. Mary's County | 38° 7′ | 76° 23′ | 50 | 26.6 | 43.3 | 41.8 | 49.6 | 65.5 | 78.8 | 81.1 | ..... | 73.1 | 59.2 | 48.6 | 34.6 | 16 |
| 17 St. Inigoes, St. Mary's County | 38° 9′ | 76° 23′ | 100 | 38.2 | 42.7 | 44.1 | 55.2 | 64.9 | 73.8 | 79.4 | 76.1 | 68.5 | 58.9 | 52.6 | 39.5 | 17 |
| 18 St. Mary's, St. Mary's County | 38° 11′ | 76° 26′ | 45 | 35.8 | 37.2 | 42.3 | 53.8 | 61.8 | 72.6 | 76.1 | 78.0 | 70.5 | 57.8 | 47.2 | 38.9 | 18 |
| 19 Leonardtown, St. Mary's County | 38° 17′ | 76° 38′ | 45 | 41.5 | 39.8 | 43.2 | 52.8 | 61.7 | 71.6 | 74.7 | 75.5 | 69.0 | 55.4 | 44.9 | 38.8 | 19 |
| 20 Solomon's, Calvert County | 38° 19′ | 76° 27′ | 20 | 33.0 | 34.0 | 36.0 | 51.0 | 64.7 | 77.5 | 78.2 | 78.7 | 69.2 | 58.0 | 46.4 | 36.0 | 20 |
| 21 Nottingham, Prince George's County | 38° 42′ | 76° 42′ | 30 | ..... | 31.4 | 46.5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 21 |
| 22 Ft. Washington, Prince George's Co. | 38° 42′ | 77° 2′ | 60 | 35.8 | 38 2 | 45.8 | 56.9 | 67.3 | 75.5 | 79.6 | 77.1 | 69.2 | 59.1 | 46.9 | 37.3 | 22 |
| 23 Fort Foote, Prince George's County | 38° 46′ | 77° 2′ | 95 | 32.5 | 34.0 | 41.0 | 52.0 | 63.6 | 73.6 | 78.0 | 74.7 | 66.0 | 54.5 | 41.8 | 34.1 | 23 |
| 24 Bladensburg, Prince George's Co. | 38° 57′ | 76° 56′ | 105 | 31.3 | 33.7 | 40.8 | 51.7 | 62.6 | 73.0 | 76.1 | 74.5 | 63.8 | 54.5 | 43.5 | 33.9 | 24 |
| 25 Agricultural College, Pr. George's Co | 38° 58′ | 76° 56′ | 170 | 36.2 | 37.0 | 45.9 | 55.0 | 62.6 | 71.8 | 73.3 | 72.9 | 68.4 | 56.2 | 46.4 | 42.8 | 25 |
| 26 Jewell, Anne Arundel County | 38° 45′ | 76° 37′ | 165 | 37.2 | 37.4 | 29.6 | 55.7 | 64.8 | 75.2 | 76.1 | 75.4 | 69.0 | 54.2 | 45.8 | 38.1 | 26 |
| 27 Annapolis, Anne Arundel County | 38° 58′ | 76° 30′ | 20 | 32.0 | 36.2 | 41.7 | 52.5 | 62.9 | 73.6 | 78.0 | 76.0 | 69.3 | 57.0 | 45.7 | 37.7 | 27 |
| 28 Fort Severn, Anne Arundel County | 38° 59′ | 76° 29′ | 20 | 33.2 | 34.7 | 42.8 | 54.0 | 64.5 | 72.7 | 77.9 | 76.0 | 68.8 | 57.6 | 46.8 | 36.7 | 28 |
| 29 Gambrill's, Anne Arundel County | 39° 4′ | 76° 40′ | 160 | 45.3 | 43.6 | 40.4 | ..... | ..... | ..... | 78.0 | 73.8 | 66.9 | 53.5 | 47.8 | 40.8 | 29 |
| Sums | ..... | ..... | ..... | 458.6 | 523.2 | 591.8 | 640.2 | 766.9 | 888.7 | 1009.5 | 908.7 | 891.7 | 735.9 | 604.4 | 489.2 | |
| Means | ..... | ..... | ..... | 35.3 | 37.4 | 42.3 | 53.4 | 63 9 | 74.1 | 77.7 | 75.7 | 68.6 | 56.6 | 46.5 | 37.6 | |

## Table of Mean Temperatures—Monthly.

| | STATIONS. | Latitude. | Longitude. | Altitude—feet. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Northern Central Maryland. | | | | | | | | | | | | | | | | |
| 30 | Baltimore........ .............. ... | 39° 18′ | 76° 37′ | 178 | 34.3 | 37.0 | 42.1 | 53.2 | 63.9 | 72.3 | 78.6 | 74.5 | 68.2 | 58.0 | 47.1 | 38.5 | 30 |
| 31 | Catonsville, Baltimore County.. .... | 39° 17′ | 76° 44′ | 525 | 25.6 | 30.5 | 36.4 | 50.8 | 59.0 | 70.4 | 74.6 | 69.0 | 66.4 | 55.3 | 45.9 | 30.5 | 31 |
| 32 | Emory Grove, Baltimore County.... | 39° 29′ | 76° 50′ | 652 | 17.6 | ..... | 46.4 | 57.6 | 77.7 | 87.8 | ...... | 74.4 | 68.4 | 68.5 | 46.7 | ..... | 32 |
| 33 | McDonogh School, Baltimore Co.... | 39° 23′ | 76° 46′ | 545 | 31.1 | 33.8 | 37.4 | 50.6 | 63.6 | 70.6 | 74.3 | 71.8 | 64.8 | 54.1 | 43.8 | 34.2 | 33 |
| 34 | St. John's Church, Baltimore County | 39° 31′ | 76° 48′ | 700 | ..... | ..... | ..... | ..... | 74.9 | 83.9 | ...... | ..... | ..... | ..... | ..... | ..... | 34 |
| 35 | Reisterstown, Baltimore County..... | 39° 28′ | 76° 50′ | 740 | 28.0 | 28.4 | 38.1 | 45.3 | 59.8 | 71.8 | 74.8 | 70.2 | 65.7 | 58.8 | 38.8 | 31.3 | 35 |
| 36 | Fort McHenry.......... .......... | 39° 16′ | 76° 35′ | 36 | 22.7 | 34.6 | 41.6 | 52.7 | 63.2 | 72.2 | 76.9 | 74.8 | 68.2 | 57.1 | 45.4 | 35.9 | 36 |
| 37 | Darlington, Harford County....... | 39° 38′ | 76° 12′ | 300 | 28.0 | 28.0 | 35.0 | 49.2 | ...... | 72.8 | 74.2 | 74.0 | 64.2 | 52.4 | 41.3 | 36.6 | 37 |
| 38 | Fallston, Harford County........... | 39° 30′ | 76° 24′ | 300 | 31.5 | 32.7 | 37.7 | 49.7 | 61.2 | 70.1 | 74.3 | 64.1 | 65.1 | 54.4 | 42.6 | 33.6 | 38 |
| 39 | Woodstock, Howard County........ | 39° 20′ | 76° 52′ | 400 | 31.1 | 33.2 | 38.1 | 50.9 | 62.2 | 70.9 | 74.3 | 71.5 | 64.6 | 53.2 | 41.4 | 34.1 | 39 |
| 40 | Ellicott (St. Clement's Hall), Howard County..................... | 39° 16′ | 76° 48′ | 300 | 31.8 | 43.8 | 39.5 | 56.0 | 67.2 | ...... | ...... | ..... | 65.6 | 58.0 | 43.6 | 30.6 | 40 |
| 41 | Sandy Springs, Montgomery County. | 39° 8′ | 77° 2′ | 500 | 29.9 | 35.3 | 40.1 | 50.7 | 62.5 | 70.8 | 75.5 | 72.2 | 66.0 | 56.7 | 42.6 | 33.5 | 41 |
| 42 | Great Falls, Montgomery County.... | 39° 0′ | 77° 15′ | 150 | 31.0 | 36.0 | 37.0 | 51.8 | 64.6 | 77.1 | 74.0 | 75.3 | 67.4 | 53.6 | 42.6 | 36.3 | 42 |
| 43 | Gaithersburg, Montgomery County.. | 39° 8′ | 77° 12′ | 516 | 33.8 | 33.1 | 35.6 | 49.4 | 57.4 | 68.1 | 70.2 | 70.5 | 62.7 | 49.7 | 41.5 | 35.4 | 43 |
| 44 | Mount Airy, Carroll County......... | 39° 23′ | 77° 9′ | 813 | 35.0 | 33.5 | 38.0 | 47.8 | 61.9 | 73.5 | 77.8 | 74.5 | 68.0 | 55.4 | 42.3 | 30.2 | 44 |
| 45 | Sam's Creek, Carroll County ....... | 39° 28′ | 77° 3′ | 650 | 29.0 | 32.2 | 32.4 | 52.3 | 61.3 | 74.0 | 76.8 | 69.9 | 63.0 | 52.8 | 38.0 | 31.0 | 45 |
| 46 | Schellman Hills, Carroll County..... | 39° 23′ | 77° 0′ | 673 | 30.9 | 31.2 | 40.6 | 50.8 | 62.7 | 70.5 | 73.8 | 69.8 | 65.7 | 54.2 | 43.6 | 33.7 | 46 |

## TABLE OF MEAN TEMPERATURES—MONTHLY.

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Northern Central Md.*—Concluded. | | | | | | | | | | | | | | | | |
| 47 Linwood, Carroll County | 39° 33′ | 77° 3′ | 425 | ..... | ..... | ..... | ..... | 66.2 | 73.3 | ..... | ..... | ..... | ..... | ..... | ..... | 47 |
| 48 New Windsor, Carroll County | 39° 32′ | 77° 6′ | 450 | 30.2 | 35.0 | 41.7 | ..... | ..... | ..... | 75.1 | ..... | ..... | ..... | ..... | 37.4 | 48 |
| 49 Union Bridge, Carroll County | 39° 34′ | 77° 10′ | 400 | ..... | ..... | ..... | ..... | 65.5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 49 |
| 50 Emmitsburg, Frederick County | 39° 42′ | 77° 20′ | 715 | 29.5 | 31.5 | 37.0 | 50.4 | 60.0 | 69.8 | 73.7 | 71.5 | 64.6 | 52.2 | 40.2 | 31.5 | 50 |
| 51 Frederick, Frederick County | 39° 25′ | 77° 25′ | 250 | 32.6 | 34.2 | 40.2 | 53.2 | 62.7 | 72.0 | 75.8 | 73.4 | 66.1 | 54.6 | 43.4 | 37.4 | 51 |
| 52 Mt. St. Mary's, Frederick County | 39° 40′ | 77° 20′ | 720 | 31.1 | 33.6 | 38.4 | 51.4 | 61.2 | 69.4 | 75.6 | 72.5 | 64.8 | 54.5 | 42.6 | 34.1 | 52 |
| 53 New Market, Frederick County | 39° 23′ | 77° 16′ | 550 | 32.0 | 33.1 | 38.5 | 47.1 | 62.8 | 74.2 | 77.6 | 73.9 | 65.7 | 54.5 | 41.9 | 34.2 | 53 |
| 54 New Midway, Frederick County | 39° 34′ | 77° 18′ | 485 | 30.4 | 35.5 | 37.0 | 51.3 | 70.9 | 73.4 | 82.4 | 71.9 | 67.5 | 51.5 | 43.8 | 33.6 | 54 |
| 55 Distributing Reservoir, D. C | 38° 55′ | 77° 6′ | 120 | 32.0 | 36.0 | 37.0 | 51.9 | 64.6 | 77.6 | 76.5 | 77.2 | 65.6 | 54.8 | 43.6 | 37.3 | 55 |
| 56 Receiving Reservoir, D. C. | 38° 57′ | 77° 7′ | 160 | 32.0 | 36.0 | 37.0 | 51.6 | 64.4 | 77.2 | 76.2 | 76.4 | 66.0 | 54.4 | 43.2 | 36.7 | 56 |
| 57 Washington, D. C. | 38° 54′ | 77° 3′ | 112 | 33.6 | 36.1 | 41.4 | 52.8 | 63.6 | 71.5 | 77.6 | 73.5 | 67.4 | 57.3 | 46.4 | 37.8 | 57 |
| Sums | ..... | ..... | | 736.1 | 814.3 | 917.8 | 1170.8 | 1587.3 | 1744.7 | 1740.6 | 1592.4 | 1513.3 | 1247.5 | 985.1 | 815.4 | |
| Means | ..... | ..... | | 30.7 | 33.9 | 38.2 | 50.9 | 63.5 | 72.8 | 75.7 | 72.4 | 65.8 | 54.2 | 42.8 | 34.0 | |

## Table of Mean Temperatures—Monthly.

| STATIONS. | Latitude. | Longitude. | Altitude—feet. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WESTERN MARYLAND. | | | | | | | | | | | | | | | | |
| 58 Leitersburg, Washington County.... | 39° 41′ | 77° 37′ | 575 | 29.0 | 29.9 | 41.2 | 48.9 | 61.0 | 69.2 | 73.3 | 72.0 | 63.8 | 52.5 | 40.4 | 31.8 | 58 |
| 59 Hagerstown, Washington County... | 39° 39′ | 77° 43′ | 550 | 31.0 | 36.0 | 36.0 | ...... | ...... | 71.4 | ...... | ...... | ...... | ...... | ...... | 41.7 | 59 |
| 60 Green Spring Furnace, Washington Co | 39° 38′ | 77° 58′ | 500 | 26.7 | 30.6 | 35.4 | 50.8 | 64.4 | 75.0 | 78.4 | 77.6 | 68.0 | 50.0 | 37.2 | 26.7 | 60 |
| 61 Edgemont, Washington County..... | 39° 40′ | 77° 33′ | 800 | 24.3 | 31.5 | ...... | 49.5 | ...... | ...... | ...... | 78.6 | 69.2 | ...... | 44.5 | ...... | 61 |
| 62 Cumberland (*a*), Alleghany County.. | 38° 39′ | 78° 46′ | 700 | 38.5 | 40.8 | 39.4 | 54.8 | 63.2 | 74.1 | 75.3 | 75.5 | 68.0 | 54.8 | 45.8 | 39.6 | 62 |
| 63 Cumberland (*b*), Alleghany County.. | 39° 39′ | 78° 46′ | 700 | 30.0 | 31.5 | 36.8 | 49.2 | 59.6 | 68.8 | 72.0 | 69.9 | 62.3 | 48.6 | 40.1 | 32.3 | 63 |
| 64 Boettcherville, Alleghany County... | 39° 39′ | 78° 48′ | 900 | 31.0 | 37.0 | 39.0 | 48.8 | 61.8 | 73.8 | 74.6 | 75.0 | 64.0 | 52.9 | 38.8 | 37.2 | 64 |
| 65 Mt. Savage, Alleghany County...... | 39° 42′ | 78° 52′ | 1200 | 30.6 | 26.3 | 40.2 | 51.9 | 61.6 | 64.2 | 69.5 | 70.7 | 65.4 | 51.7 | 44.3 | 32.9 | 65 |
| 66 Oakland, Garrett County.......... | 39° 24′ | 79° 25′ | 2500 | 31.9 | 19.3 | 31.7 | 44.3 | 53.5 | 66.1 | ...... | ...... | ...... | 49.2 | 41.5 | 32.2 | 66 |
| 67 Deer Park, Garrett County.......... | 39° 25′ | 79° 20′ | 2600 | 26.0 | 32.8 | 34.9 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 22.6 | 67 |
| Sums....... ................ | ...... | ..... | ...... | 274.7 | 284.2 | 334.6 | 348.7 | 425.1 | 562.6 | 443.1 | 519.3 | 460.7 | 359.7 | 288.1 | 397.0 | |
| Means....... ... ....... ... | ...... | ...... | ...... | 30.5 | 31.6 | 37.2 | 49.8 | 60.7 | 70.3 | 73.8 | 72.7 | 65.8 | 51.4 | 41.2 | 33.0 | |

### TABLE OF MEAN TEMPERATURES—SEASONAL AND ANNUAL.

| STATIONS. | Seasons. Spring. | Summer. | Autumn. | Winter. | Year. | Periods. Beginning. | End. | Length. Years. | Mos. | Observers. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EASTERN MARYLAND. | | | | | | | | | | | |
| 1 Princess Anne, Somerset County.... | 56.1 | 75.5 | 58.8 | 39.8 | 57.6 | Mar, 1822 | July, 1850. | 28 | | Dr. Samuel Ker. | 1 |
| 2 Barron Creek Springs, Wicomico Co. | 52.2 | 74.0 | 56.0 | 39.1 | 55.3 | June, 1888. | Jan, 1893. | 4 | 7 | A. E. Acworth. | 2 |
| 3 Federalsburg, Caroline County...... | 49.9 | .... | .... | 38.8 | ...... | Oct., 1881. | May, 1882. | | 8 | A. H. Boies | 3 |
| 4 Denton, Caroline County.. ......... | ...... | ...... | ...... | 31.2 | ...... | Nov., 1892 | Jan, 1893 | | 3 | F. C Ramsdel. | 4 |
| 5 Isthmus, Talbot County......... | ...... | ...... | ...... | ...... | ...... | Apr., 1843. | July, 1845. | | 6 | R. Banning. | 5 |
| 6 Easton, Talbot County ............ | 52.6 | 76.3 | 55.2 | 36.2 | 55.1 | Nov, 1891 | Jan, 1893 | 1 | 3 | G. W. Minnick and son. | 6 |
| 7 Chestertown, Kent County.......... | 51.8 | 74.2 | 56.3 | 33.8 | 54.0 | June, 1855. | July, 1864. | 6 | 10 | Prof. J. R. Dutton and others. | 7 |
| 8 Galena, Kent County....... ... .... | 53.4 | 74.3 | 54.9 | 38.2 | 55.2 | Sept, 1888. | June, 1890. | 1 | 10 | Henry Parr. | 8 |
| 9 Elkton, Cecil County... .......... | ...... | ...... | ...... | ...... | ...... | July, 1844. | | | 1 | F. Finch. | 9 |
| 10 Woodlawn, Cecil County.... ........ | 49.9 | 73.2 | 58.7 | 31.0 | 52.0 | Jan, 1865. | Dec, 1875. | 11 | 0 | J. O. McCormick. | 10 |
| 11 Del. Breakwater, Sussex Co., Del..... | 49.4 | 71.3 | 56.1 | 36.0 | 53.2 | Feb, 1880. | Feb, 1885. | 5 | 1 | United States Signal Service. | 11 |
| 12 Milford, Kent County, Del ......... | 51.8 | 74.0 | 53.6 | 35.9 | 53.7 | Dec, 1857. | May, 1878. | 9 | 5 | W. R. Phillips, R. H. Gilman, etc. | 12 |
| 13 Dover, Kent County, Del.. ......... | 52.8 | 75 1 | 57.4 | 35.6 | 55.2 | Aug, 1870. | Jan, 1893. | 12 | 8 | J. H. Bateman. | 13 |
| 14 Fort Delaware, Newcastle Co., Del.. | 50 7 | 75.8 | 57.6 | 34.6 | 54.3 | Jan, 1825. | Dec, 1870. | 19 | 10 | United States Post Hospital. | 14 |
| 15 Kirkwood, Newcastle County, Del... | 50 2 | 75.8 | 54.5 | 35.0 | 53.9 | Oct, 1888. | Jan, 1893. | 4 | 3 | William Carnagy. | 15 |
| Sums...... ............ .... | 620.8 | 819 0 | 614.1 | 433.5 | 599.5 | | | | | | |
| Means........................ | 51.7 | 74.5 | 55.8 | 36.1 | 54.5 | | | | | | |

## TABLE OF MEAN TEMPERATURES—SEASONAL AND ANNUAL.

| STATIONS. | Seasons. | | | | Year. | Periods. | | | | Observers. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spring. | Summer. | Autumn. | Winter. | | Beginning. | End. | Length. Years. | Length. Mos. | | |
| SOUTHERN MARYLAND. | | | | | | | | | | | |
| 16 Ridge, St. Mary's County. ....... | 52.3 | ..... | 60.8 | 34.8 | ...... | May, 1856. | June, 1857. | 1 | 1 | F. G. Stagg. | 16 |
| 17 St. Inigoes, St. Mary's County.... . | 54.7 | 76.4 | 60.0 | 40.1 | 57.8 | Feb, 1871. | Feb, 1879. | 7 | 5 | J. F. Ellicott. | 17 |
| 18 St Mary's, St. Mary's County... ... | 52.6 | 75.6 | 58.5 | 37 3 | 56.0 | Dec, 1859. | Dec, 1890. | 8 | 1 | Rev. J. Stephenson and others. | 18 |
| 19 Leonardtown, St. Mary's County.... | 52.6 | 73 9 | 56 4 | 40.0 | 55.7 | Jan, 1858 | Jan, 1893. | 8 | 1 | Dr. A. McWilliams and Geo. W. Joy | 19 |
| 20 Solomon's, Calvert County .. ..... | 50.6 | 78.1 | 57.9 | 34.3 | 55.2 | Jan, 1892 | Jan, 1893. | 1 | 0 | Dr. W. H. Marsh. | 20 |
| 21 Nottingham, Prince George's County | .... | ..... | ..... | ..... | .... | Feb, 1849. | Mar, 1849. | . | 2 | Dalrymple. | 21 |
| 22 Ft Washington, Prince George's Co. | 56 7 | 77 4 | 58.4 | 37.1 | 57.4 | Jan, 1824 | Aug, 1872. | 18 | 6 | United States Post. | 22 |
| 23 Ft. Foote, Prince George's County... | 53.2 | 75 4 | 54.1 | 33.5 | 53.8 | July, 1871. | Oct, 1878. | 7 | 4 | United States Hospital. | 23 |
| 24 Bladensburg, Prince George's Co... | 51.7 | 74 2 | 53 9 | 33.0 | 53.2 | Dec, 1854. | Aug, 1865. | 10 | 0 | B. O. Lowndes. | 24 |
| 25 Agricultural College, Pr George's Co | 54.5 | 72 7 | 57.0 | 38.7 | 55.7 | Jan, 1861 | Dec, 1889. | 2 | 3 | Agricultural College. | 25 |
| 26 Jewell, Anne Arundel County. . . | 53.4 | 75.6 | 56.3 | 37.6 | 55.7 | Oct, 1888. | Jan, 1893. | 4 | 2 | Joseph Plummer. | 26 |
| 27 Annapolis, Anne Arundel County. . | 52.4 | 75.9 | 57 8 | 35 3 | 55.2 | Nov, 1855. | June, 1876. | 19 | 8 | Dr Zermbask and W. R. Goodman. | 27 |
| 28 Fort Severn, Anne Arundel County | 53.8 | 75.5 | 57.7 | 34.9 | 55.5 | Jan, 1822. | July, 1845. | 7 | 7 | United States Post. | 28 |
| 29 Gambrill's, Anne Arundel County .. | 56.1 | .... | ..... | 43 2 | ..... | Sept, 1888. | Feb, 1890. | 1 | 1 | J. E. Mogue. | 29 |
| Sums ... ..... ......... .... | 637.5 | 830.7 | 743.9 | 479.8 | .... | | | | | | |
| Means......... ......... .... | 53.1 | 75 5 | 57.2 | 36.9 | 55.6 | | | | | | |

**Table of Mean Temperatures—Seasonal and Annual.**

| | Stations. | Seasons. | | | | Year. | Periods. | | | | Observers. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring. | Summer. | Autumn. | Winter. | | Beginning. | End. | Length. Years. | Length. Mos. | | |
| | Northern Central Maryland. | | | | | | | | | | | |
| 30 | Baltimore | 53.0 | 75.1 | 57.8 | 36.6 | 55.6 | Jan, 1817. | Jan, 1893. | 40 | 9 | L. Brantz, Dr. Edmondson, A. Mayer and U. S. Weather Bureau. | 30 |
| 31 | Catonsville, Baltimore County | 48.7 | 71 8 | 55 9 | 28.9 | 51.2 | Dec, 1865. | Feb, 1868. | 2 | 3 | G. S. Grope. | 31 |
| 32 | Emory Grove, Baltimore County | 60.6 | ..... | 61.2 | ..... | .... | Aug, 1878. | Aug. 1879. | .. | 10 | J. A. Johnson. | 32 |
| 33 | McDonogh School, Baltimore Co. | 50.5 | 72.2 | 54.2 | 33.0 | 52.5 | Jan, 1876. | Jan, 1893. | 17 | 0 | McDonogh School. | 33 |
| 34 | St. John's Church, Baltimore County | ..... | ..... | ..... | ..... | ..... | May, 1881. | June, 1881. | .. | 2 | J. A. Johnson. | 34 |
| 35 | Reisterstown, Baltimore County | 47.9 | 72.3 | 52.6 | 29.2 | 50 4 | Nov, 1872. | Feb, 1875. | 2 | 4 | Rev. R. Heber Murphy. | 35 |
| 36 | Fort McHenry | 52.5 | 74.6 | 56.9 | 34.4 | 54.6 | Jan, 1831. | Jan, 1893. | 58 | 1 | United States Hospital. | 36 |
| 37 | Darlington, Harford County | ..... | 73 7 | 52.6 | 30.9 | ..... | Oct, 1891. | Jan, 1893. | 1 | 2 | A. F. Galbreath. | 37 |
| 38 | Fallston, Harford County | 49.5 | 69.5 | 54.0 | 32.6 | 51.4 | Sept, 1870. | Jan, 1898. | 20 | 9 | Prof. G. G. Curtis. | 38 |
| 39 | Woodstock, Howard County | 50.4 | 72.2 | 53.1 | 32.8 | 52.1 | Dec, 1870. | Jan, 1893. | 22 | 2 | Woodstock College. | 39 |
| 40 | Ellicott (St Clement's Hall), Howard County | 54.2 | ..... | 54.1 | 35.4 | ..... | Nov, 1871. | Apr, 1873. | 1 | 0 | W. H. Shelden. | 40 |
| 41 | Sandy Spring, Montgomery County. | 51.1 | 72.8 | 55.1 | 32.9 | 53.0 | Dec, 1876. | June, 1884. | 7 | 7 | Allan Farquhar. | 41 |
| 42 | Great Falls, Montgomery County | 51.1 | 75.5 | 54.5 | 34.4 | 53.9 | July, 1891. | Jan, 1893. | 1 | 6 | Colonel Elliott. | 42 |
| 43 | Gaithersburg, Montgomery County | 47.1 | 69.6 | 51.3 | 34.1 | 50.4 | May, 1888. | Dec, 1891. | 3 | 8 | John T. DeSellum. | 43 |
| 44 | Mt. Airy, Carroll County | 49.2 | 75.3 | 55.2 | 32.9 | 53.2 | Jan, 1872. | Nov, 1874. | 2 | 10 | Dr. E. A. Vannort. | 44 |
| 45 | Sam's Creek, Carroll County | 48.7 | 73.6 | 51.3 | 30.7 | 51.1 | June, 1871 | Aug, 1874. | 2 | 1 | F. J. DeVillvise. | 45 |
| 46 | Schellman's Hills, Carroll County | 51.4 | 71.4 | 54.5 | 31.9 | 52.3 | Jan, 1846 | Dec, 1865. | 20 | 0 | Miss H. M. Baer and others. | 46 |

TABLE OF MEAN TEMPERATURES—SEASONAL AND ANNUAL.

| | STATIONS. | Seasons. | | | | Year. | Periods. | | | | Observers. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring. | Summer. | Autumn. | Winter. | | Beginning. | End. | Length. Years. | Length. Mos. | | |
| | *Northern Central Md.*—Concluded. | | | | | | | | | | | |
| 47 | Linwood, Carroll County | .. | .... | .... | .... | .... | May, 1871. | June, 1871. | .. | 2 | C. F. Haussler. | 47 |
| 48 | New Windsor, Carroll County | .... | .... | .... | 34.2 | .... | Jan, 1853. | Dec, 1853. | .. | 5 | Nelson. | 48 |
| 49 | Union Bridge, Carroll County | .... | .... | .... | .... | .... | May, 1864. | .... | . | 1 | U. Gellingham. | 49 |
| 50 | Emmitsburg, Frederick County | 49.1 | 71.4 | 52.3 | 30.8 | 51.0 | Nov, 1866. | Apr, 1869 | 2 | 8 | E. Smith. | 50 |
| 51 | Frederick, Frederick County | 52.0 | 73.7 | 54.7 | 34.7 | 53.8 | Jan, 1854. | Jan, 1893. | 16 | 2 | H. E. Hanshew, McClintock, Young and others | 51 |
| 52 | Mt. St. Mary's, Frederick County | 50.3 | 72.5 | 54.0 | 32.9 | 51.4 | Jan, 1867. | Jan, 1893. | 20 | 11 | Prof. C. H. Jourdan, Prof. J. A. Mitchell and others. | 52 |
| 53 | New Market, Frederick County | 49.5 | 75.2 | 54.0 | 33.1 | 53.0 | Jan, 1873. | Jan, 1893. | 7 | 3 | Dr. H. H. Hopkins. | 53 |
| 54 | New Midway, Frederick County | 53.1 | 75.9 | 54.3 | 33.2 | 54.1 | Sept, 1886. | Feb, 1888. | 1 | 5 | George F. Smith. | 54 |
| 55 | Distributing Reservoir, D. C | 51.2 | 77.1 | 54.7 | 35.1 | 54.5 | Nov, 1891. | Jan, 1893. | 1 | 2 | Lieutenant-Colonel Elliott. | 55 |
| 56 | Receiving Reservoir, D. C. | 51.0 | 76.6 | 54.5 | 34.9 | 54.2 | Nov, 1891. | Jan, 1893. | 1 | 2 | Lieutenant-Colonel Elliott. | 56 |
| 57 | Washington, D. C. | 52.6 | 74.2 | 57.0 | 35.5 | 54.8 | Jan, 1871. | Jan, 1893. | 22 | 0 | United States Weather Bureau. | 57 |
| | Sums | 1714.3 | 1616.0 | 1248.6 | 795.1 | .... | | | | | | |
| | Means | 50.6 | 73.5 | 54.3 | 33.1 | 53.0 | | | | | | |

TABLE OF MEAN TEMPERATURERS—SEASONAL AND ANNUAL.

| | STATIONS. | Seasons. | | | | Year. | Periods. | | | | Observers. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring. | Summer. | Autumn. | Winter. | | Beginning. | End. | Length. Years. | Length. Mos. | | |
| | WESTERN MARYLAND. | | | | | | | | | | | |
| 58 | Leitersburg, Washington County... | 50.4 | 71.5 | 52.2 | 30.2 | 51.1 | June, 1858. | June, 1862. | 4 | 4 | J. E. Bell. | 58 |
| 59 | Hagerstown, Washington County...... | ...... | ...... | ...... | 36.2 | ...... | June, 1852. | Mar, 1892. | .. | 5 | C. Feldman. | 59 |
| 60 | Green Spring Furnace, Washington Co | 50.2 | 77.0 | 51.7 | 28.0 | 51.7 | Jan, 1872. | Nov, 1873. | 1 | 10 | E. G. Kinsell. | 60 |
| 61 | Edgemont, Washington County...... | ...... | ...... | ...... | ...... | ...... | Apr, 1892. | Mar, 1893. | .. | 6 | Charles Felcman. | 61 |
| 62 | Cumberland (a), Alleghany County.. | 52.5 | 75.0 | 56.2 | 39.6 | 55.8 | June, 1889. | Mar, 1893. | 3 | 6 | H. Shriver. | 62 |
| 63 | Cumberland (b), Alleghany County.. | 48.5 | 70.2 | 50.3 | 31.3 | 50.1 | Jan, 1859. | Mar, 1893. | 35 | 6 | E. T. Shriver. | 63 |
| 64 | Boettcherville, Alleghany County... | 49.9 | 74.5 | 51.9 | 35.1 | 52.8 | Nov, 1891. | Mar, 1893. | 1 | 4 | F. F. Brown. | 64 |
| 65 | Mt. Savage, Alleghany County...... | 51.2 | 68.1 | 53.8 | 29.9 | 50.8 | Jan, 1846. | Dec, 1846. | 1 | .. | T. C. Atkinson. | 65 |
| 66 | Oakland, Garrett County. .......... | 43.2 | ...... | ...... | 27.8 | .... | Dec, 1857. | Dec, 1864. | .. | 10 | L. R. Cafran and P. Tabb. | 66 |
| 67 | Deer Park, Garrett County................ | | ...... | ...... | 27.1 | ...... | Dec, 1880. | Mar, 1882. | .. | 7 | L. H. Schoolfield. | 67 |
| | Sums.......................... | 345.9 | 436.3 | 316.1 | 285.2 | ...... | | | | | | |
| | Means.......................... | 49.4 | 72.7 | 52.7 | 31.7 | 52.0 | | | | | | |

## PRECIPITATION.

The atmospheric precipitation in Maryland occurs both as rain and snow. There is no portion of the State in which either is entirely wanting, although the snowfall is far less in the eastern and southern districts than in the northern and western. The snowfall never fails completely even in the warmest winters, although it may be reduced to insignificant proportions.

The precipitation is more or less equally distributed throughout the months, when the means for a long term of years are taken into consideration, although wet and dry periods characterize the seasons of a single year, causing marked variations from the normal. A certain constant increase in the mean precipitation is found to occur in the spring and late summer, with a corresponding decrease in the autumn and winter.

The western portion of the State has a less amount of annual precipitation than the eastern. A heavy rainfall characterizes the region which lies to the east of the Catoctin Mountains, the easterly winds, as they reach the highlands, precipitating their moisture in the Frederick valley and over the western slope of the Piedmont Plateau. The eastern slope of the Piedmont Plateau has again less precipitation.

The western portion of the Coastal Plain has a much drier climate than the eastern, although numerous local exceptions appear. For example, the western shores of the Chesapeake have relatively much greater precipitation than the eastern, which makes the average precipitation for Southern Maryland exceed that for Eastern Maryland. The central and western portion of Eastern Maryland has a much greater rainfall than the area bordering the Atlantic.

The precipitation generally accompanies the areas of low pressure which traverse the country from west to east, and pass to the north of Maryland. It commonly occurs on their eastern front during the prevalence of easterly winds.

In the following table will be found the mean monthly, seasonal and annual precipitation for the State as a whole, and the four climatic divisions of the same, which have been previously characterized.

TABLE OF MEAN PRECIPITATION FOR MARYLAND.

| | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maryland.... | 3.31 | 3.07 | 3.92 | 3.75 | 4.21 | 3.72 | 4.11 | 3.77 | 3.67 | 2.75 | 3.22 | 2.69 |

Graphical Representation of Mean Temperatures in the Four Climatic Divisions of Maryland.

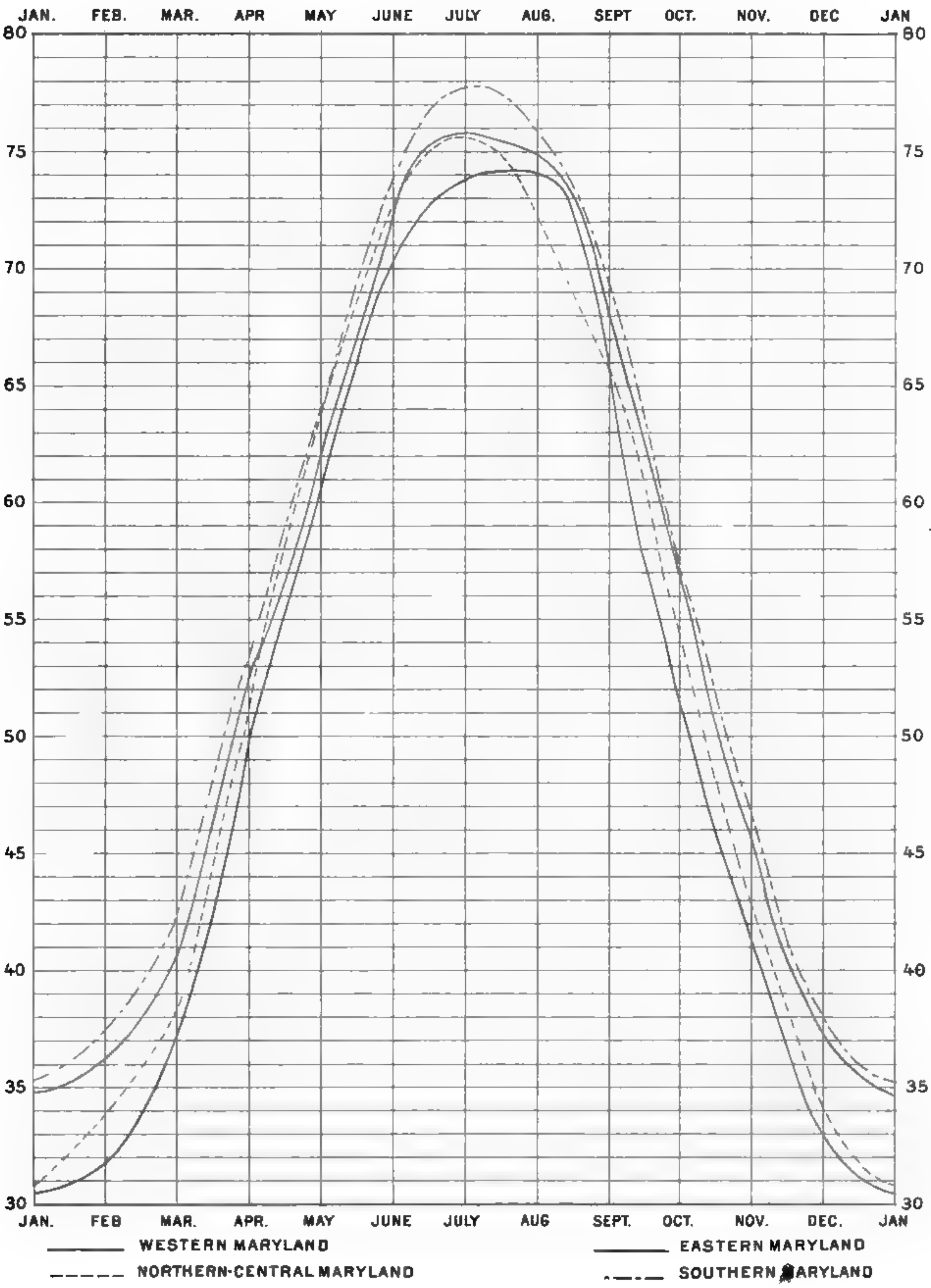

TABLE OF MEAN PRECIPITATION FOR MARYLAND—CONTINUED.

| | Seasons. | | | | |
|---|---|---|---|---|---|
| | Spring. | Summer. | Autumn. | Winter. | Year. |
| Maryland ......... .... ..... ..... .. .... | 12.88 | 11.60 | 9.64 | 9.31 | 43.43 |

TABLE OF MEAN PRECIPITATION IN THE FOUR CLIMATIC DIVISIONS OF MARYLAND.

| Climatic Divisions. | January. | February. | March. | April. | May. | June. | July | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Maryland... .... .... ..... | 3 51 | 3.22 | 4.06 | 4.04 | 4 29 | 3.18 | 4 78 | 3.78 | 3.39 | 3.04 | 2.70 | 2.67 |
| Southern Maryland .. ..... ......... | 3.20 | 3.51 | 4 20 | 4.11 | 4.40 | 3.70 | 4 42 | 3.84 | 3.80 | 2.86 | 4.11 | 2.60 |
| Northern Central Maryland ... .... | 3.50 | 3 10 | 4.39 | 3.62 | 4.06 | 3.48 | 4.45 | 3 98 | 4.03 | 2 74 | 3 25 | 3.13 |
| Western Maryland................. | 3.01 | 2.45 | 3.02 | 3.23 | 4.08 | 4.58 | 2.77 | 3 48 | 3.46 | 2.35 | 2 82 | 2 35 |

| Climatic Divisions. | Seasons. | | | | Year. |
|---|---|---|---|---|---|
| | Spring. | Summer. | Autumn. | Winter. | |
| Eastern Maryland.............. ............ | 12.39 | 11 74 | 9.13 | 9.40 | 42.66 |
| Southern Maryland ... ......... ......... | 12.71 | 11.96 | 10 77 | 9.31 | 44.75 |
| Northern Central Maryland.... . ......... | 12 07 | 11.91 | 10.02 | 9.73 | 43.73 |
| Western Maryland ......................... | 10.33 | 10.78 | 8.63 | 8.81 | 38.55 |

On the succeeding pages are given the stations at which the longest records of precipitation have been kept. They vary from one to over fifty years. At Fort McHenry, in Baltimore Harbor, there is an almost continuous record since 1836. In Baltimore City the earliest data were collected in 1817, but there have been numerous breaks in the record.

The variations in annual rainfall are quite marked in some instances. The lowest recorded annual rainfall in Baltimore, for example, was in 1819, when there were 28.75 inches; the greatest was in 1846, when there were 62.04 inches, while the mean annual rainfall is 44.34 inches. At Fort McHenry the lowest annual rainfall reported is 22.43 inches, in 1870; the highest, 66.38 inches, in 1889. Records have also been kept at other places for a considerable period, and similar striking variations in the annual precipitation are found.

## TABLE OF MEAN RAINFALL—MONTHLY, SEASONAL AND ANNUAL.

| STATIONS. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Seasons. Spring. | Seasons. Summer. | Seasons. Autumn. | Seasons. Winter. | Year. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Ocean City, Worcester County | 3.91 | 3.63 | 2.16 | 2.01 | 2.66 | 1.91 | 3.56 | 2.57 | 2.93 | 1.44 | 2.37 | 3.97 | 6.83 | 8.04 | 6.74 | 11.51 | 33.12 | 1 |
| 2 Barron Creek Springs, Wicomico County | 3.59 | 4.14 | 6.26 | 4.70 | 4.24 | 2.66 | 6.73 | 4.16 | 3.53 | 4.80 | 3.47 | 2.22 | 15.20 | 13.55 | 11.80 | 9.95 | 50.50 | 2 |
| 3 Easton, Talbot County | 4.39 | 2.98 | 4.98 | 4.51 | 5.05 | 3.06 | 2.63 | 1.09 | 1.84 | 0.79 | 2.44 | 2.52 | 14.54 | 6.78 | 4.77 | 9.89 | 35.98 | 3 |
| 4 Chestertown, Kent County | 2.99 | 1.90 | 3.20 | 4.70 | 4.42 | 3.82 | 2.98 | 7.01 | 3.37 | 2.86 | 3.16 | 2.49 | 12.32 | 13.81 | 9.39 | 7.38 | 42.90 | 4 |
| 5 Galena, Kent County | 3.06 | 3.08 | 4.60 | 4.66 | 4.99 | 3.72 | 8.46 | 2.09 | 4.63 | 4.36 | 6.79 | 1.80 | 14.25 | 12.27 | 15.78 | 7.94 | 50.24 | 5 |
| 6 Woodlawn, Cecil County | 3.10 | 3.61 | 4.18 | 3.65 | 4.29 | 3.93 | 4.33 | 5.74 | 4.01 | 3.98 | 3.97 | 3.00 | 12.12 | 14.00 | 11.96 | 9.71 | 47.79 | 6 |
| 7 St. Mary's, St. Mary's County | 3.55 | 3.41 | 4.26 | 4.06 | 4.03 | 3.17 | 3.61 | 5.35 | 3.00 | 2.78 | 3.39 | 2.91 | 12.35 | 12.13 | 9.17 | 9.87 | 43.52 | 7 |
| 8 St. Inigoes, St. Mary's County | 2.52 | 4.06 | 4.94 | 4.23 | 4.27 | 2.12 | 3.67 | 3.54 | 4.77 | 3.67 | 3.44 | 3.36 | 13.44 | 9.33 | 11.88 | 9.94 | 44.59 | 8 |
| 9 Leonardtown, St. Mary's County | 1.30 | 3.18 | 3.41 | 3.40 | 5.34 | 2.64 | 7.35 | 1.21 | 1.52 | 1.13 | 6.60 | 1.28 | 12.05 | 11.20 | 9.25 | 6.26 | 38.76 | 9 |
| 10 Solomon's, Calvert County | 5.09 | 4.07 | 4.68 | 5.23 | 2.99 | 4.00 | 2.49 | 2.89 | 1.57 | 0.67 | 3.90 | 2.41 | 12.90 | 9.38 | 6.14 | 11.57 | 39.99 | 10 |
| 11 Fort Washington, Prince George's County. | 2.65 | 2.88 | 3.57 | 3.30 | 4.06 | 3.28 | 2.46 | 4.52 | 2.98 | 3.06 | 3.99 | 3.16 | 10.93 | 11.26 | 10.03 | 8.69 | 40.91 | 11 |
| 12 Fort Foote, Prince George's County | 1.70 | 1.93 | 2.89 | 2.61 | 2.67 | 2.95 | 3.37 | 5.02 | 3.94 | 2.67 | 3.02 | 1.53 | 8.37 | 11.34 | 9.63 | 5.16 | 34.50 | 12 |
| 13 Bladensburg, Prince George's County | 2.98 | 2.32 | 3.86 | 3.96 | 3.89 | 3.50 | 2.90 | 3.21 | 3.06 | 2.54 | 2.64 | 3.00 | 11.71 | 9.61 | 8.24 | 8.30 | 37.86 | 13 |
| 14 Agricultural College, Prince George's Co. | 4.09 | 5.23 | 3.44 | 6.91 | 6.24 | 6.14 | 6.31 | 3.88 | 3.56 | 3.65 | 6.22 | 1.04 | 16.59 | 16.33 | 13.43 | 10.36 | 56.71 | 14 |
| 15 Jewell, Anne Arundel County | 3.05 | 4.06 | 6.39 | 5.40 | 5.59 | 4.50 | 7.55 | 3.87 | 4.85 | 4.25 | 4.21 | 2.56 | 17.38 | 15.92 | 13.31 | 5.96 | 52.57 | 15 |
| 16 Fort Severn, Anne Arundel County | 3.95 | 3.02 | 3.13 | 1.97 | 4.55 | 4.03 | 4.14 | 3.83 | 8.42 | 3.46 | 4.29 | 3.81 | 9.65 | 12.00 | 16.17 | 10.78 | 48.60 | 16 |
| 17 Annapolis, Anne Arundel County | 3.31 | 3.49 | 4.55 | 4.15 | 4.69 | 4.39 | 4.78 | 4.90 | 4.10 | 3.60 | 3.46 | 3.57 | 13.50 | 14.07 | 11.16 | 10.37 | 49.19 | 17 |
| 18 Washington, D. C | 3.36 | 3.31 | 4.20 | 3.16 | 3.90 | 4.29 | 4.65 | 4.44 | 3.98 | 3.27 | 2.91 | 2.97 | 11.26 | 13.88 | 10.16 | 9.64 | 44.94 | 18 |
| 19 Receiving Reservoir, D. C | 5.29 | 1.75 | 6.27 | 5.34 | 4.81 | 3.01 | 4.86 | 1.19 | 4.10 | 0.26 | 2.95 | 4.61 | 16.42 | 9.06 | 7.31 | 11.65 | 44.44 | 19 |
| 20 Distributing Reservoir, D. C | 5.33 | 1.77 | 7.04 | 5.28 | 4.32 | 1.42 | 6.40 | 1.40 | 4.85 | 0.31 | 3.52 | 4.15 | 16.64 | 9.22 | 8.68 | 11.25 | 44.79 | 20 |

TABLE OF MEAN RAINFALL—MONTHLY, SEASONAL AND ANNUAL.

| | STATIONS. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Seasons. Spring. | Seasons. Summer. | Seasons. Autumn. | Seasons. Winter. | Year. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | Baltimore | 3.20 | 3.54 | 4.09 | 3.27 | 3.55 | 4.09 | 4.94 | 4.48 | 3.84 | 3.09 | 3.15 | 3.10 | 10.91 | 13.51 | 10.08 | 9.84 | 44.34 | 21 |
| 22 | Fort McHenry | 2.46 | 2.80 | 3.51 | 3.05 | 3.49 | 4.02 | 3.61 | 3.99 | 3.37 | 2.94 | 2.99 | 3.28 | 10.05 | 11.62 | 9.30 | 8.54 | 39.51 | 22 |
| 23 | McDonough School, Baltimore County | 2.52 | 2.39 | 2.86 | 1.58 | 2.32 | 3.17 | 2.88 | 2.36 | 2.39 | 1.86 | 2.27 | 1.94 | 6.76 | 8.41 | 6.52 | 6.85 | 28.54 | 23 |
| 24 | Reisterstown, Baltimore County | 2.86 | 3.29 | 2.73 | 5.16 | 3.03 | 0.82 | 3.53 | 5.86 | 4.85 | 2.84 | 3.09 | 1.78 | 10.92 | 10.21 | 10.78 | 7.93 | 39.84 | 24 |
| 25 | Fallston, Harford County | 3.53 | 3.95 | 4.16 | 2.72 | 3.61 | 3.76 | 3.87 | 4.65 | 3.54 | 3.06 | 3.18 | 3.30 | 10.49 | 12.28 | 9.78 | 10.78 | 43.33 | 25 |
| 26 | Woodstock, Howard County | 3.84 | 3.37 | 4.28 | 3.12 | 4.11 | 3.71 | 3.49 | 4.19 | 3.91 | 3.39 | 3.36 | 2.69 | 11.51 | 11.39 | 10.66 | 9.90 | 43.46 | 26 |
| 27 | Great Falls, Montgomery County | 4.05 | 2.99 | 3.72 | 1.56 | 3.07 | 3.46 | 5.50 | 3.65 | 6.67 | 2.04 | 2.92 | 3.18 | 8.35 | 12.61 | 11.63 | 10.22 | 42.81 | 27 |
| 28 | Sandy Springs, Montgomery County | 3.50 | 3.37 | 4.12 | 2.72 | 3.13 | 4.98 | 5.08 | 4.76 | 3.54 | 3.67 | 3.09 | 3.38 | 9.97 | 14.77 | 10.30 | 10.25 | 45.29 | 28 |
| 29 | Mt. Airy, Carroll County | 5.43 | 4.42 | 5.57 | 5.09 | 3.21 | 1.71 | 4.47 | 7.63 | 4.98 | 4.70 | 2.83 | 5.15 | 13.87 | 13.81 | 12.51 | 15.00 | 55.19 | 29 |
| 30 | Sam's Creek, Carroll County | 1.10 | 1.80 | 2.50 | 2.50 | 5.07 | 3.32 | 4.14 | 6.38 | 2.50 | 3.88 | 3.14 | 1.50 | 10.07 | 13.84 | 9.52 | 4.40 | 37.83 | 30 |
| 31 | Shellman Hills, Carroll County | 4.34 | 3.06 | 4.21 | 4.88 | 5.57 | 4.28 | 4.37 | 3.28 | 4.78 | 3.87 | 3.58 | 3.76 | 14.66 | 11.93 | 12.23 | 11.16 | 49.98 | 31 |
| 32 | Taneytown, Carroll County | 3.18 | 3.46 | 6.11 | 3.55 | 4.03 | 4.00 | 7.37 | 2.42 | 2.18 | 1.36 | 3.83 | 2.82 | 13.69 | 13.79 | 7.37 | 9.46 | 44.31 | 32 |
| 33 | Frederick, Frederick County | 3.18 | 3.38 | 7.52 | 4.66 | 6.34 | 4.17 | 5.75 | 4.03 | 4.98 | 3.95 | 2.98 | 2.14 | 15.52 | 13.95 | 11.91 | 8.70 | 50.08 | 33 |
| 34 | Mt. St. Mary's, Frederick County | 3.37 | 3.11 | 4.40 | 3.33 | 4.40 | 4.04 | 3.39 | 3.34 | 3.79 | 3.82 | 3.92 | 3.13 | 12.13 | 10.77 | 11.53 | 9.61 | 44.04 | 34 |
| 35 | New Market, Frederick County | 2.93 | 2.77 | 4.08 | 4.18 | 3.11 | 3.95 | 4.18 | 5.00 | 4.52 | 2.77 | 4.93 | 2.69 | 11.37 | 13.13 | 12.22 | 8.39 | 45.11 | 35 |
| 36 | New Midway, Frederick County | 3.06 | 4.28 | 1.97 | 2.62 | 6.12 | 3.84 | 6.21 | 2.74 | 3.84 | 1.08 | 3.14 | 3.99 | 10.71 | 12.79 | 8.06 | 11.33 | 42.89 | 36 |
| 37 | Leitersburg, Washington County | 3.80 | 2.36 | 2.68 | 4.55 | 3.57 | 3.94 | 2.43 | 3.05 | 4.47 | 2.54 | 2.82 | 3.04 | 10.80 | 9.42 | 9.83 | 9.20 | 39.25 | 37 |
| 38 | Green Spring Furnace, Washington Co. | 1.90 | 2.33 | 1.98 | 2.58 | 3.82 | 3.35 | 3.72 | 6.38 | 3.32 | 3.92 | 2.92 | 0.95 | 8.38 | 13.45 | 10.16 | 5.18 | 37.17 | 38 |
| 39 | Cumberland (a), Alleghany County | 2.42 | 2.71 | 4.89 | 3.08 | 5.09 | 4.86 | 3.08 | 3.76 | 3.70 | 2.73 | 3.03 | 2.62 | 13.06 | 11.70 | 9.46 | 7.75 | 41.97 | 39 |
| 40 | Cumberland (b), Alleghany County | 2.21 | 2.60 | 3.06 | 2.46 | 3.23 | 3.90 | 3.51 | 3.21 | 2.91 | 2.34 | 2.34 | 2.23 | 8.75 | 10.62 | 7.59 | 7.04 | 34.00 | 40 |
| 41 | Boettcherville, Alleghany County | 4.70 | 1.95 | 2.50 | 3.50 | 4.70 | 6.60 | 1.10 | 1.00 | 2.90 | 0.20 | 3.00 | 2.90 | 10.70 | 8.70 | 6.10 | 9.55 | 35.05 | 41 |

### HUMIDITY.

The capacity of the atmosphere to hold moisture varies, but vapor of water is always present in greater or less amounts. When the atmosphere is near saturation the air is moist, but when it is capable of taking more water it becomes dry in proportion to the amount which can thus be taken. If the saturated state is taken as the standard of comparison, or 100, then the relative amount of moisture can be indicated by percentage.

Observations have been recorded at comparatively few points, so that reliable means are difficult to obtain. The following table gives the relative humidity of a few stations during the year 1892:

| Stations. | January. | February. | March. | April. | May. | June. | July | August. | September. | October. | November. | December. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baltimore | 79 | 78 | 73 | 65 | 69 | 77 | 72 | 73 | 72 | 67 | 70 | 74 | 73 |
| Barron Creek Springs | 85 | 87 | 84 | 72 | 72 | 80 | 78 | 82 | 78 | 71 | 77 | 84 | 79 |
| McDonough | 80 | 80 | 74 | 60 | 66 | 75 | 73 | 82 | 80 | 72 | 76 | 70 | 75 |
| Washington, D. C | 74 | 73 | 70 | 65 | 70 | 75 | 76 | 73 | 74 | 68 | 70 | 74 | 72 |

From 1871 to 1892 the mean relative humidity in Baltimore has been as follows:

| 1871 to 1892. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baltimore | 70 | 65 | 64 | 61 | 65 | 68 | 68 | 70 | 74 | 68 | 70 | 68 | 67 6 |

### WINDS.

The prevailing winds in Maryland are northwest. During the summer months they are more from the south, varying from southwest to southeast in the eastern and central portions of the State; while in the winter months they are more from the northwest and west. In the mountainous regions in Western Maryland the winds are more constantly from the northwest and west throughout the year.

Continuous records have been kept at only a few points sufficiently long to establish reliable means. Those obtained at Baltimore during the last 22 years are the best. They are given below:

MEAN DIRECTION OF WIND AT BALTIMORE DURING THE PAST 22 YEARS.

| Month. | Direction. | Followed by Rain or Snow. | |
|---|---|---|---|
| | | Most Likely. | Least Likely. |
| January | N. W. | N. E. to S. E. | N. to W. |
| February | N. W. | N. E. to S. E. | N. to W. |
| March | N. W. | S. E. to S. W. | N. to W. |
| April | N. W. | S. E. to S. W. | N. to W. |
| May | S. E. | N. E. to S. E. | N. to W. |
| June | S. E. | S. E. to S. W. | N. to W. |
| July | S. W. | S. E. to S. W. | N. W. to N. E. |
| August | S. W. | S. E. to S. W. | N. W. to N. E. |
| September | N. | E. to S. | N. to W. |
| October | N. W. | E. to S. | N. to W. |
| November | N. W. | N. E. to S. E. | N. to W. |
| December | N. W. | N. E. to S. E. | N. to W. |
| Annual Mean | N. W. | | |

Other stations, at which less complete records have been kept, indicate the same general conclusion, except that the westerly direction of the wind veers more and more to the southerly in passing from the inland mountainous region toward the coast.

Along the shore line of the State during the warmer months there are inflowing currents of air, or sea breezes, which moderate the temperature of the land for some distance from the coast. They generally blow from mid-day till sundown, and are due to the heated atmosphere over the land rising and thus causing the cooler air over the water to flow in to take its place.

### BAROMETRIC PRESSURE.

The variations in barometric pressure are not very great in the more populous portions of the State. Since none of the larger towns are situated at a height of even 1,000 feet above sea level, the variations in the mercury column due to elevation would not, at ordinary temperatures, exceed one inch. Even the highest ranges of the western portion of the State would show a difference of but little over three inches. In recording barometric observations, however, it is customary to make corrections by reducing the readings to a common datum, which is that of sea level. The most important variations in the barometric pressure are due to the passage of areas of low pressure, few of which, however, take their track directly across the State. Most of them pass to the north of the confines of Maryland. Their coming is generally accompanied by rainfall; and are preceded by a rise and followed by a fall in temperature. Barometric observations have been taken continuously at only a few points in the State, and no important general conclusions can be drawn from the

records. The mean monthly barometric readings for Baltimore from 1871 to 1892 are given in the following table:

| January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.06 | 30.14 | 29.99 | 29.98 | 29.98 | 30.00 | 29.90 | 30.00 | 30.01 | 30.06 | 30.10 | 30.14 | 30.03 |

THE MEDICAL CLIMATOLOGY OF MARYLAND.

It would be inappropriate here to enter upon the general consideration of the influence exerted by different localities and climates over the health of individuals, as this would of itself require a volume. Every one has remarked the striking difference which is observable in various classes of the community, according to the quality of the air they breathe and the nature of their callings. What can be more marked than the contrasts in appearance between the inhabitants of a malarious country and the inhabitants of a mountainous country; between those who take active exercise in the open air and the pallid countenances and deficient muscular energy exhibited by the inhabitants of a metropolis, who, during the greater part of the day, inhale the close and vitiated atmosphere of work-shops and counting-houses?

It is not merely the breathing of a warm or cold air, a dry or damp one, which requires to be considered in a remedial point of view, but also the action of these states of the atmosphere upon the surface of the body, and consequently upon the internal organs. Every medical man is aware of the close relation existing between the skin and kidneys, and how the functions of these respective organs are influenced or modified by external circumstances, such as temperature and climate. In winter, or in a cold climate, an increased flow of the renal secretion takes place, and there is a corresponding diminution in the amount of insensible if not free perspiration; whereas in summer or in warm climates the reverse occurs. When, therefore, we consider the variableness of the climate, we at once perceive a cause for the great prevalence in this country of many diseases which resist the action of medicine, but are removed or alleviated by change of climate. Anything which lowers the vital powers of the system, as dissipation, fatigue, hunger or improper food, renders the body more liable to be affected by deleterious external agencies. Anxiety, disappointment and other depressing moral influences act in the same way, and are more frequently instrumental in the production of disease than is generally supposed. Hence traveling, change of air and scenery tend materially to prevent or counteract the operation of the above-mentioned

causes by the greater facility and inducement offered for being more out of doors. The cheering influence upon the mind of clear skies and sunshine in winter; the interest excited by scenery of a novel and magnificent character, are calculated to divert the mind from unpleasant or gloomy ideas, and thereby aid in the removal of many diseases, such as are induced by or connected with circumstances of a mental nature.

A fair prospect and a pure atmosphere are the points of importance,—"*qualis aer talis spiritus; et cujusmodi spiritus humores,*"—the former regales the mind, the latter refreshes the body. Plato recommended that no traveller should lodge in a place that is not governed by proper sanitary laws. Neither the traveller nor the invalid will always meet in this country with the sanitary regulations which are most conducive to health; but he may, at all events, find the spirit if not the letter of the sage's advice by adopting a residence in selected localities of the State of Maryland. In the high lands he may realize a delightful summer climate; in the low lands a healthful winter home.

The natural divisions of the State, which we shall consider seriatim, are as below: Western Maryland, which extends from the Susquehanna river to the top of the Alleghany Mountains; Southern Maryland, which lies between the Chesapeake bay and the Potomac river; the Eastern Shore, which embraces all that part of the State east of the Susquehanna river and the bay. No other State in the Union, perhaps, presents such facilities for change of climate within its own borders. The alternations from the mountain top to the sea shore, and *vice versa*, are so various and complete as to awaken, with each change, new sensations of health and pleasure, and to "purge all infections from our air."

We know that temperature is diminished by elevation; but we know also that the relation which these forces bear to each other is not a fixed quantity. Thus it requires an elevation of 330 feet in the torrid zone to effect a decrease in temperature equal to 1° of Fahrenheit's scale, whereas, in this latitude an elevation of 250 feet exerts the same influence. On this basis, allowing for the fact that the thermometer, after the first part of the ascent, records a marked diminution of temperature for very small increments of elevation, we may safely assert that there is a difference of fully 15° in the mean winter temperature of Ocean City, in Worcester county, and Oakland, in Garrett county. This difference, however, does not obtain in regard to the mean summer temperature of these respective localities, for the reason that maritime climates are usually free from excessive changes of temperature. The seasons near the seashore are not marked by sudden vicissitudes; but are, on the contrary, slow in their successions, while their temperature is never free from moisture.

## WESTERN MARYLAND.

A brief sketch of the climatological peculiarities of Western Maryland will serve to supply a desideratum to the pleasure-seeker, as well as the valetudinarian in search of a cool and invigorating summer residence. The leading characteristic of this section of the State, apart from its exhilarating atmosphere, is the magnificent scenery. Regarded from many outlooks, this feature is well-nigh immeasurable. Its rivers and rivulets, as well as its mountains and valleys, are of the most imposing order. Its climate, diverse as it must necessarily be, is marked by extremes of temperature, the winter season being exceedingly cold, and that of summer correspondingly hot at midday, but refreshingly cool in the evening and early morning.

In the lower or eastern counties of this section of the State, the climate, although very diverse, is much milder than that of the Alleghanies. The winters are less severe and the summers are quite cool, the heat being alleviated by refreshing breezes, which cross, in their course, the waters of Chesapeake bay, from which they abstract a good deal of moisture, and mitigate both the heat of summer and the rigors of winter.

The early frosts, which occasionally do so much damage, are here comparatively harmless. The snow, likewise, disappears much sooner in the spring, and the average depth is considerably less than in the counties further west. But the charm of this particular section, nestling in the foot-hills of the Blue Ridge mountain, consists in its genial summer and autumn climate, and its proximity to the metropolis of the State, which renders it invaluable, as a convenient and healthful resort, for the overworked denizens of the city.

The class of patients to whom the climate of Western Maryland may be recommended, are those chiefly to whose sluggish vital energies an invigorating atmosphere would be likely to yield an impulse; in whom the blood-making powers are deficient, and whose physical systems have been reduced, either by actual disease or the wear and tear of prolonged work.

## SOUTHERN MARYLAND.

The climate of Southern Maryland is mild, equable and moist. It is protected, in a measure, from the evil effects of high winds by the rising ground to the north and west. The general condition of the atmosphere, together with the natural arrangement of the surface of the ground, affords abundant opportunity for out-door exercise. In a therapeutic point of view, the climate in the winter season is sedative, without being absolutely relaxing; while, in the hot months, its excellent facilities for bathing will prove decidedly refreshing to visitors coming from warmer inland places.

As a matter of course, patients requiring a bracing climate, with a dry atmosphere, should not be sent to Southern Maryland. Invalids of a low nervous type, suffering from atonic dyspepsia, as well as persons of a scrofulous, or otherwise debilitated constitution, should avoid the locality. In affections of the mucous membrane lining the air passages, characterised by lack of secretion, this climate may be recommended; but in other varieties of bronchial trouble, where there is copious secretion and a general relaxation of the system, it should be avoided. In advanced cases of pulmonary consumption, and, indeed, in cases which have passed the threshold of the disease, Southern Maryland would not be a desirable residence. In a good many cases of chronic bronchitis, simulating phthisis, improvement to health may be expected, and, in some, complete restoration from a state of great debility and seeming danger, has been noticed.

Southern Maryland is remarkably exempt from typhoid fever and diphtheria, as compared with the western counties of the State. Malaria, at one time so prevalent, is of much less frequent occurrence than formerly, and will possibly be still further eradicated when improved water supplies and drainage have been introduced. In many places the rising grounds are clothed with plantations of pine and cedar. These pine woods give a peculiar character to certain localities, as at Pine Point, a well-known bathing shore on the Potomac river. When south and southwest winds are very gentle the sky is often clear for many days together during the winter. On these occasions the warmth and softness of the air are truly delightful; and, when taken in conjunction with the beautiful water scenery, the calm blue bay, the broad Potomac, the green meadows, the balsamic pine and other evergreens common to this section, one is almost tempted to forget that it is a winter landscape he is contemplating.

### THE EASTERN SHORE OF MARYLAND.

This peninsula has been recommended for several years as a valuable resort for invalids afflicted with pulmonary consumption and other affections of the lungs. Its reputation in this respect has extended widely and rapidly, and the "Shore" has become, in addition to being a temporary resort of those who seek to avoid a cold winter and spring elsewhere, the permanent habitation of others who have taken up their abode in the villas and villages which adorn the gently undulating surface of the country. The Eastern Shore has a peculiar climate within a general climate. The latter, that is to say the climate on the southern coast, is mild, equable and humid; the former, that of the inland and bay counties, while partaking of the general characteristics of the southern coast, is less marked in its general features, and is especially less moist, and in some respects more healthful.

As a winter resort for invalids of a phthisical tendency, the Eastern Shore is undoubtedly possessed of peculiar advantages, provided the change to it be made at a sufficiently early stage of the disorder, and that the invalid be content to submit to a proper course of hygienic discipline. An invalid who is recovering from an attack of inflammation of the lungs, or from severe pleurisy, without tubercle, could not select a better winter resort; and in the sensitive condition of the respiratory organs which is left by an attack of bronchitis, or in a case of chronic bronchitis, this climate will be found to be remarkably serviceable. An asthmatic invalid, meaning by this a person affected with the pure spasmodic form, is either exactly suited by the climate, or not suited at all. The trial is the only test.

In most of the forms of heart-trouble a residence on the Eastern Shore is conducive to comfort, and the avoidance of those mischances to which the patient thus afflicted is peculiarly liable. In some instances, however, it proves unsuitable. The distinction should not be difficult to make beforehand. When the patient suffers from over-impulse of the heart, difficulty in breathing on slight exertion, with a sense of obstructive oppression in the chest, particularly if the complexion be florid and the skin hard and dry, the climate of this section will agree well. But when the patient is pallid and flabby, frequently faintish and always feeble, the skin soft, cool and often moist, with cool perspiration; when, in short, the heart is constantly too weak, without any active irritation in the lungs, and with a low state of the general vital power, as a rule, this climate will not agree.

In chronic affections of the digestive mucous membrane, the Eastern Shore proves either exceedingly beneficial, or quite the reverse, according to the nature of the case. Neuralgia, when it depends on chronic irritation of some mucous or muscular surface, is benefited by a residence here. When, on the other hand, it is the relic of a former malarial agency, this climate may awaken the old susceptibility of the faulty nerve. Pure rheumatism, whether acute or chronic, is often benefited. Uncomplicated affections of the liver, affections far more rare than is generally supposed, are not suited by this climate; but there are certain forms of functional derangement of the liver for which a residence here proves very advantageous.

### DISEASES INFLUENCED BY CLIMATE.

In a study of the diseases for which change of climate is advisable, it is only with chronic maladies, or with the sequelæ of acute disorders, such as typhoid fever, diphtheria, scarlet fever, dysentery, &c., that we have to deal; for in such cases only can change of climate be resorted to as a medium of cure. Certainly there are cases in which change of air is

prophylactic to disease, as in cholera, yellow fever, and maladies of that class, but as such diseases are epidemic and not endemic in this State, their discussion is foreign to the present article.

The diseases in which the various climates of Maryland are both beneficial and curative may be classed as follows: Chlorosis, anæmia, general debility, nervous affections, asthma, bronchial and laryngeal affections, affections of the urinary and uterine organs, cutaneous diseases, dyspepsia, with its varied complications, hypochondriasis, diseases of the liver and kidneys, rheumatism, malaria, and the world's terrible scourge, consumption, or tuberculous deposit in the lungs, from which, in this country alone, more than 100,000 human beings annually die.. Let us now make a *resumé* of the above diseases.

*Chlorosis* and *Anæmia* are nearly allied, and are characterized by the same vitiated state of the blood—a state generally produced by insufficient or improper food, bad ventilation, want of exercise, or, on the part of females, some disorder of the menstruation. In all cases of this class nothing equals change of air; from the mountains to the low lands, or from the low lands to the mountains, as the case may be.

In case of *General Debility* or *Nervous Affections*, we have the authority of Dr. Harvey for saying that, though in most cases of nervous disease certain special remedial agents may be necessary, still, beyond every thing else, change of air and change of scenery, accompanied as they must be with changed thought and altered nervous action, will be found the true remedial agents. Such cases will be well suited by the climate of Western Maryland.

In *Asthma*, change of air is generally followed by the most marked benefit; frequently the removal of a mile or two produces very considerable relief. Most of the cases of asthma need to be judged by their peculiar characteristics, as a great deal depends upon temperament; and where one case improves under a dry and elastic climate, in another all the symptoms are aggravated thereby. In most of these cases the patient finds out for himself what suits him best. In Maryland he can be suited with almost every variety and character of climate that could be desired in such cases—the mild and moist air of the seashore, the elastic, dry air of the mountain, the modified urban air, and the medium suburban air.

*Bronchial Throat Affections* are amongst the most benefited by change of air, but it is only in their chronic forms that this curative agent will be of benefit. In cases of bronchial affection, with low muscular power and considerable cough, we can recommend the moderately elevated districts; but when the temperament is nervous, and more humidity is required, the eastern shore is to be preferred.

In diseases of the *Uterine* and *Urinary Organs*, it is generally considered that climate has more or less influence. In the *Diseases* of *Women* and girls, such as hysteria, chorea, and affections of the menstrual function, change of climate is a great curative agent. In certain cases where the catamenia are delayed beyond the ordinary time, removal to the eastern shore will be attended, in most cases, with marked benefit.

*Dyspepsia*. There is no disorder in which change of air and scenery, joined with cheerful company and moderate excitement, exerts a more beneficial influence than in the various forms of dyspepsia, arising, as these cases generally do, from want of exercise, close confinement, anxiety, care, or inattention to the general laws of health. A change of air, however slight, if only combined with change of habit, food and water, must be beneficial. In such cases it matters but little what the change may be, so long as there is a change. The mountain resorts are to be preferred during the summer months, and the Eastern Shore at all other times. Dyspeptic patients visiting or residing in Maryland need not, in general, be limited to one place. Although, as advised by Sir James Clark, the climate most suited to their complaint should be selected as their headquarters, they may visit, at any time, the principal cities and resorts in the State; and if this is done with judgment, the successive changes will prove beneficial to their health. Hypochondriasis is closely allied with, and dependent upon, dyspepsia, and the indications here are change from place to place, society, mental endeavor to conquer real or imaginary trouble, exercise, regular habits, early hours, bathing and cleanliness.

*Pulmonary Consumption*. This disease, above all others, is the one for which change of climate is continually sought. So much has been written and said of this disease that to go further than call attention to its etiology and prophylaxis would be superfluous. Riverius made the observation as long ago as 1668 that "contagion is the chiefest cause of consumption," but no general acceptance of this theory ever obtained until very recently. Of the hereditary transmission of the disease there can be no doubt, but heredity does not account for a majority of the cases. Improper food, imperfect ventilation, the introduction of foreign and extraneous substances, such as irritating particles of dust, into the cells of the lungs, are often factors in the causation of the disease. Taking the nature and causes of the disease into consideration, it is quite evident that in no class of disease is change of climate of less value than in this. What we really want is improved vital power, good food and pure air. If softening has not taken place, then change of climate may be beneficial. Where shall the patient be sent? is the important question. With the exception of the Himalaya Mountains, in India, and the Kirghis Steppe, of Asia, which is an area of land below the level of the sea, no

place in the world enjoys such complete immunity from pulmonary consumption as the Eastern Shore of Maryland, and by timely seeking this healing climate many persons may be permanently cured or greatly relieved. As a winter resort, or as an all-the-year-round home for invalids, few localities can offer greater attractions.

*Malaria.* Removal from the malarious district is important if not absolutely essential to the recovery of suffering from this protean malady. The disease is not confined to any particular locality or climate. It extends from the Atlantic to the Pacific ocean, from the St. Lawrence river to the Gulf of Mexico. The question of the relative healthfulness of different sections of Maryland, as regards malaria, cannot be accurately determined, inasmuch as we have no system for the collection of vital and mortuary statistics; but personal observation and inquiry, combined with data collected from physicians and local health authorities all over the State, would seem to indicate that, whatever the condition of the Eastern Shore may have been in former years, when malaria is reputed to have engulfed all of human kind that toiled upon its surface, it is, at this time, remarkably exempt from diseases of all kinds, and especially malaria. This exemption is owing, no doubt, in a great measure, to the drying of the soil by drainage and cultivation, to the growth of large fields of clover, which exhale peroxide of hydrogen, to the destruction of mill-dams; but above all to improved water supplies in many districts. Wells have been bored very generally, from 300 to 500 feet deep, from which excellent water is procured, and by using it the health of the inhabitants has greatly improved, which would seem to indicate that the subsoil water formerly used for drinking purposes had a great deal to do with the causation of malaria in that section of the State.

## WATER SUPPLY.

Most of the larger cities and towns of the State are supplied with public water systems, in some instances constructed at private, in others at municipal, expense. Where water works have not been built the supply is obtained from shallow or driven wells and from springs.

*Annapolis.* The Annapolis water works were built by a stock company, in 1865-66. The supply is obtained from a stream about four miles distant from the town, and is pumped into two receiving reservoirs, with a capacity of 9,000,000 gallons. The water reaches the different parts of the city by gravity, through cast-iron mains, aggregating about nine miles in length. The capital stock has a par value of $61,450. In 1879 the company issued $35,000 of bonds for the cost of laying new pipe. All but $8,000 of these bonds have been redeemed.

*Baltimore.* The water supply of Baltimore, built at municipal expense, is one of the largest and in many respects one of the finest in

the country. It is constructed on the gravity system combined with pumping to the distributing reservoirs. The supply is obtained from two streams which flow down the eastern slope of the Piedmont Plateau, viz:—the Jones' Falls and the Gunpowder River. Dams have been built across the streams, forming in the first instance, Lake Roland, 225 feet above tide, and in the second, Loch Raven, 170 feet above tide. Lake Roland covers 116 acres, and has an estimated capacity of 400,000,000 gallons. Loch Raven covers 252 acres, and has an estimated capacity of 510,000,000 gallons. The two systems of Jones' Falls and Gunpowder River are capable of furnishing daily a supply of about 165,000,000 gallons of water.

The Lake Roland supply is carried to the Hampden Reservoir, 217 feet above tide water, with a capacity of 46,000,000 gallons, to the Druid Lake, in Druid Hill Park, of an equal elevation, with a capacity of 493,000,000 gallons, to the High Service Reservoir, with a capacity of 26,000,000 gallons, and to the Mount Royal Reservoir, with a capacity of 30,000,000 gallons.

The Loch Raven supply is carried to Lake Montebello, with a capacity of 510,000,000 gallons, thence to Clifton Lake, with a capacity of 265,000,000 gallons, and to Guilford Reservoir, of 41,000,000. The aggregate storage capacity is, therefore, including the conduits, 2,346,000,000 gallons.

The Lake Roland Conduit is 3.8 miles in length, and is built in oval form, of stone and brick masonry. It is 6½ feet high and 5 feet wide.

The Loch Raven Conduit to Lake Montebello, is 517 feet less than 7 miles in length, and is built in circular form, 12 feet in diameter, for 2 miles arched with brick, and for 5 miles hewn in the solid rock.

The distributing pipes run for over 300 miles beneath the streets of the city.

The cost of the entire system has been estimated at about $10,000,000.

*Catonsville.* The water-works at Catonsville were built by a joint stock company in 1886-87. The supply is obtained from artesian wells and the Patapsco River. The water is pumped to a stand pipe of 185,000 gallons capacity. The daily capacity of the works is estimated at 500,000 gallons. The length of the mains is about 8 miles.

*Centreville.* The Centreville water-works were built in 1889. The source of the water is a small stream near the town. The system of water supply is that of gravity, combined with pumping. The cost of the works was about $10,000.

*Chestertown.* The works were built in 1885 by a joint stock company. The supply is obtained from springs which flow into a receiving reservoir from which the water is pumped into a distributing reservoir, the capacity of the latter being about 240,000 gallons. From this reser-

voir the water is distributed by gravity through the mains, which aggregate about 4 miles in length. The daily consumption is estimated at about 50,000 gallons. The cost of construction of the works was $25,000.

*Cumberland.* The Cumberland water-works were built by the city in 1870-71, and enlarged in 1873. The supply of water is obtained from the Potomac river by direct pumping. The estimated daily capacity is about 2,000,000 gallons. The water is distributed by mains varying from 12 to 3 inches in diameter. They extend for nearly 30 miles through the streets of the city. The construction of the works cost $150,000.

*Easton.* The Easton water works were built by a joint stock company in 1886. The supply is obtained from six artesian wells 4 inches in diameter and 110 feet in depth. The water is pumped into a standpipe 12 feet in diameter and 100 feet in height. There is also a reservoir, holding 136,000 gallons, which receives its supply from a source independent of the artesian wells. The water of the reservoir is reserved for extinguishing fires. The distribution of the water throughout the town is accomplished by means of iron pipes 8 inches, 6 inches and 4 inches in diameter. They run beneath the streets for a distance of 6½ miles. There are also 40 fire plugs. The capital stock of the company is valued at $40,000.

*Frederick City.* The Frederick water works were built by the corporation by bonded debt. The supply is carried from artesian wells, springs and a mountain stream—the Tuscarora—by natural gravity, to a receiving reservoir, which is situated about one mile from the town. The capacity of the reservoir is about 2,000,000 gallons. The water is distributed to the town by gravity, through cast-iron pipes.

*Frostburg.* The Frostburg water-works were built by a joint stock company. The supply is obtained from springs and artesian wells. From the receiving reservoir the water is distributed to the town in pipes 4 to 6 inches in diameter. The length of the mains is about 4 miles. The daily consumption is estimated at about 40,000 gallons.

*Hagerstown.* The supply of water is obtained from Beaver Creek, eight miles from the town, and from artesian wells. The water is carried by gravity to a receiving reservoir with a capacity of 20,000,000 gallons. From the latter it is distributed through 18 miles of mains to the different parts of the city. The daily consumption is estimated at 500,000 gallons. The cost of the works was $150,000.

*Havre de Grace.* The Havre de Grace plant was constructed at private expense. The water is pumped directly from the Susquehanna river into the mains and reservoir, which has a capacity of about 3,000,000 gallons. The daily capacity of the pumps is estimated at

268,000 gallons. The water is distributed throughout the town by mains 4 and 6 inches in diameter. The capital stock of the company is valued at $15,000, and it has a bonded indebtedness of $15,000.

*Mechanicstown.* The Mechanicstown water-works were built by a joint stock company. The supply is obtained from mountain streams and conducted by gravity to the receiving reservoir, which has a capacity of 50,000 gallons From the reservoir the water is distributed to the town through 2½ miles of mains. The cost of construction of the works was $10,000.

*Salisbury.* The Salisbury water works were constructed at private expense. The supply is obtained by pumping from 15 driven wells, in which the water rises to within 3 feet of the surface. In addition to these, there is a flowing artesian well. The water is pumped directly into the mains, or to a stand pipe 12 feet in diameter and 100 feet high, which has a capacity of 84,000 gallons. The works cost about $30,000.

*Union Bridge.* The Union Bridge water works were built by a stock company in 1886-87. The supply is obtained from springs to the east of the town, the water being pumped to a receiving reservoir with a capacity of 425,000 gallons. The daily capacity of these pumps is 250,000 gallons. The distributing mains are composed of 4, 6 and 8-inch iron pipe, and aggregate about 2½ miles in length. The daily consumption is about 40,000 gallons. The works cost $18,000.

*Westminster.* The Westminster water works were built in 1883 by a stock company. The supply is obtained from 3 springs one mile to the southeast of the town, the water being conducted by gravity into a collecting reservoir of 500,000 gallons capacity. From this point it is pumped into a distributing reservoir 180 feet above the lowest portions of the town, and three-quarters of a mile to the east of the same. The latter reservoir has a capacity of 1,000,000 gallons. The daily capacity of the pumps is 118,000 gallons. The water mains consist of cast-iron pipe 4 to 8 inches in diameter, and with a length of about five miles. The consumption is about 15,000 gallons daily. The construction of the works cost $25,000.

Water works have also been projected in Towson, Cambridge and Upper Marlboro.

## WATER POWER.

Much valuable water power is available in the State of Maryland, but only a small part of it has been utilized down to the present time. Some of the most valuable powers are situated at a distance from railroad or water communications, so that no attempt has been made to use them while the readily-accessible localities have not been developed to their full capacity.

According to the tenth census report, Maryland held the 20th place among the States in the total amount of water power employed, and 12th in the amount used per square mile. The total water power utilized in 1880, when the last estimates were made, was equal to 18,043 horse-power, a little less than had been employed 10 years earlier, in 1870, while the amount of steam power had nearly trebled in the same period.

Very detailed investigations of the water power of Maryland were conducted in connection with the tenth census, and as much of the data is of such a character as to be of lasting value, extensive use will be made of it. The results recorded will, in many instances, be incorporated in the present statement. The water power of Maryland will be considered under the three topographic divisions hitherto explained:—1. The Coastal Plain. 2. The Piedmont Plateau. 3. The Appalachian Region.

*The Coastal Plain.* The streams of the Coastal Plain do not afford, at any point, great power on account of their sluggish, uniform currents. With the exception of the Potomac and the Susquehanna, which are tidal to the east of the "fall-line," there are no large rivers. The smaller streams, however, afford sufficient power to drive numerous grist and saw mills, which are scattered throughout the eastern and southern counties. In a few instances larger works have been established, but the country is essentially an agricultural not a manufacturing region.

*The Piedmont Plateau.* The best water-power of the State is found in the region of the Piedmont Plateau. The Potomac and Susquehanna Rivers here flow with rapid currents, and with their greatest volume before becoming tidal, while less variability is manifested than in their upper courses. The smaller streams, too, have wider drainage basins, and are less subject to sudden changes.

The Potomac River, in crossing the Piedmont Plateau, falls 230 feet, which is its height at Point of Rocks, to tide at Georgetown. The distance is 47 miles, so that the average fall per mile is about 5 inches. There are several points at which the fall is much greater, viz.: at Great Falls, 14 miles above Georgetown, where, in the distance of 1½ miles, the river descends 80 to 90 feet. This would make the average fall, for the remainder of the distance, less than 3 inches in the mile.

Ascending the river, the first available power is five miles above Georgetown, at Little Falls, where a dam (No. 1) has been constructed for the Chesapeake and Ohio Canal, formerly an important water-way across the State. The estimated power here in the low season of dry years is about 2,600 horse-power. It has been employed to some extent at Georgetown.

The next site above is at Great Falls, fourteen miles above Georgetown. The water here pours over a rocky channel, and the facilities for

building are ample on either bank. In the principal fall there is a descent of 35 or 40 feet in 100 to 150 yards, which is increased to 80 or 90 feet in a mile and a-half. The drainage area above the Great Falls is estimated at 11,476 square miles, and the available power in a low season is estimated at 20,700 horse-power, which is wholly unemployed at the present time. The water supply for the cities of Washington and Georgetown is taken from above the falls.

The next site is just below the mouth of Seneca Creek, about seven miles farther up the river, where another dam (No. 2) has been constructed for the canal.

From this latter site to Point of Rocks the river has no pronounced fall. The current is moderately rapid, but no dams have been constructed.

The only tributary of importance entering the Potomac from the north throughout this distance is the Monocacy River, which rises to the north of the northern boundary of Maryland and drains an area of somewhat over 1,000 square miles. The stream takes its course through a broad, low valley, and is as a rule sluggish. Its flow, although not so variable as the tributaries of the Potomac in the Appalachian Region, is still liable to considerable fluctuation, and freshets of some violence at times occur. Several grist and saw-mills have been built along the main stream and its tributaries.

The first stream north of the Potomac which is worthy of special mention is the Patuxent River, which west of the "fall-line" drains an area of about 200 square miles. The stream has a variable, and in dry seasons, a very small flow. Several sites have been improved and a few factories and mills built.

The next stream of importance above the Patuxent is the Patapsco, which west of the "fall-line" drains an area of about 300 square miles. It is the most important manufacturing stream in the State, and over 3,000 horse-power is utilized. No other stream in the State, with the exception of the Potomac, offers so many advantages or so many sites for power.

Two tributaries of the Patapsco which enter that stream on the northern side, below the "fall-line," viz., Gwynn's Falls and Jones' Falls, have been employed to a limited extent. Since Jones' Falls has been used by the City of Baltimore as a part of its public water supply, the mills that formerly utilized the power of the stream have been abandoned, or steam has been substituted.

The only other stream of importance before reaching the Susquehanna is the Gunpowder River, which divides, a short distance from its mouth, into Big and Little Gunpowder Creeks. The former drains an area of about 275 square miles, but the lower part of the stream is not

available for power, as one of the reservoirs to supply the City of Baltimore has been located upon it, and all the water rights below have been purchased by the city. Above the reservoir, considerable power has been utilized in the past, several small grist, saw, paper, woolen and other mills having been established. Upon the Little Gunpowder Creek, small powers have been improved, but the stream is not large.

The Susquehanna River flows 12 miles in Maryland from the State line to its mouth, during which distance it descends 69 feet, or an average of 5.75 feet per mile. There are few valuable sites, however. A canal which was built some years ago from Peach Bottom to Port Deposit, both for transportation and water-power, afforded several sites which were for a time utilized. The available horse-power produced at Port Deposit in a total fall of 80 feet in the canal was estimated in 1880 to be 94,000 horse-power in the low season of dry years.

To the east of the Susquehanna are several small streams on which the water powers have been utilized to some extent. Among the more important are Principio, Northeast and Big Elk Creeks. Several small cotton, woolen, grist, saw and paper mills have been established.

*The Appalachian Region.* With the exception of western Garrett County, all the drainage of the Appalachian Region reaches the Potomac River. Ascending that stream, from Point of Rocks, the first important site is at Weverton, 57 miles from Georgetown, at the point where the river finds its passage through the Blue Ridge Mountains. The power available here, in the low season of dry years, is estimated to be 5,100 horse-power.

A few miles further up the Potomac, at Harper's Ferry, just above the point where that stream is joined by the Shenandoah, there is, probably, the most favorable site on the river. The facilities for transportation are excellent, building materials are abundant, and there seems no reason why a large and fine power could not be utilized here. The power is estimated, in the low season of dry years, to be 2,900 horse-power. At this point is situated a dam (No. 3), connected with the canal. The fall, from the dam to the mouth of the Shenandoah, is about 22 feet.

About 8 miles above Harper's Ferry the Potomac receives the Antietam River from the north. It drains a rolling and fertile country of about 340 square miles, but its declivity is uniform and uninterrupted by falls and rapids. The stream is utilized, to a considerable extent, together with its tributaries, to run grist, flour and paper-mills. The flow of the stream is very variable, however.

Between the mouth of the Antietam River and Williamsport there are two sites upon the Potomac, one a mile below Shepardstown, which

has an estimated power, in the low season of dry years, of 920 horse-power, and a second, some 10 to 15 miles above, of 1,725 horse-power.

The Conococheague River, which joins the Potomac near Williamsport, drains an area of about 500 square miles. It resembles the Antietam, on the eastern side of the Great Valley, in all essential respects, and, like it, is utilized for grist and paper mills, none of which are very large.

There are several good sites on the Potomac between Williamsport and the junction of the north and south branches of that stream, but practically no attempt has been made to improve them. No tributaries of importance enter the Potomac from the north throughout this distance.

The north fork, which, throughout much of its course, forms the present dividing line between Maryland and West Virginia, drains an area of about 1,300 square miles. The flow of the stream, however, is very variable, and at Cumberland its maximum discharge is over 700 times its minimum, which is nearly fatal to the extensive use of water power. This great variability is explained by the absence of lakes, the steepness of the mountain slopes and the narrowness of the valleys. Some of the tributaries of the north fork partake of its general characteristics, while others are said to be quite constant in flow; but on the whole their power is of little importance.

Most of western Garrett county drains to the northward by the Youghiogheny River into the Monongahela. The flow of the streams is for the most part variable, and very little attempt has been made to utilize the power.

With some striking exceptions which have been noted in the preceding sketch, the greater portion of the developed water power of the State is found in the Piedmont Plateau. The Potomac has some excellent sites in the eastern portion of the Appalachian Region, but farther to the west they become unimportant.

Altogether there is a vast amount of undeveloped water power in the State, and in many instances the sites are most favorably located.

# CHAPTER III.

## GEOLOGY.

It is the object of this and the following chapter to present a general description of the Geology of Maryland, together with an account of the distribution, development and possibilities of such mineral resources as exist within her boundaries. To accomplish this purpose the origin, character and succession of the various rock formations will first be passed in review. This will be illustrated by a colored geological map and section, showing the areal extent and relative position of each deposit. In the next chapter the distribution of substances of economic value will then be traced through the different geological horizons, and this will be succeeded by an account of the industries which have originated through the development of minerals occurring within the State. In some cases such industries still depend mainly upon raw material obtained in Maryland, while in others, like iron, copper and chrome, the industries remain active in the State, although the local supply of material is now practically exhausted. In this portion of the work much assistance has been rendered by several gentlemen whose long experience and expert knowledge of the subjects treated, render their contributions of lasting value.

### GENERAL REVIEW OF GEOLOGY.

The State of Maryland is so situated as to display, in spite of its comparatively small size (less than 10,000 square miles), a remarkably perfect sequence of all the geological formations. The most ancient rocks which go to make up the earth's crust, as well as those still in the process of deposition, are here to be found, while between these wide limits there is hardly an important geological epoch which is not represented. It is doubtful whether another State of the Union contains a fuller history of the earth's past.

To make the completeness of this record in Maryland somewhat more intelligible, let us consider for a moment the basis on which geologists are able to determine the succession of deposits. As our globe slowly cooled from a state of igneous fusion the first rocks must have been formed by the solidification at the surface of the molten mass, while as yet the oceans and many other of the more volatile substances existed in the dense

cloudy atmosphere. Whether or not any portion of this first cooling crust now remains where it is accessible to man, is a matter of doubt. True it is, however, that ages must have elapsed before the crust had so far cooled as to allow the concentration of the oceans upon it; and ages more must have passed before this hot and chemically surcharged ocean had so far cooled and purified itself as to allow of the development of life within it. We get a still further conception of the vast lapses of time which these early rocks imply when we discover that, even after the waters had become suited for living things, a great proportion of the development and differentiation of organic types went on in beings which have left no trace. Hardly a more remarkable fact confronts us in geology than the variety and complexity of types in the earliest rocks which contain any trace of life at all. This fact, which is all the more remarkable for being attested by the best of evidence from all parts of the earth's surface, compels us to assign to the history of life before its first permanent record was deposited, a longer period than all that has since elapsed. These earliest forms were either too small and soft to allow of preservation, or else they have been obliterated in the subsequent alteration of the rocks containing them.

All the rocks which are older than the earliest fossil-bearing strata are referred to the first great division of geologic history, called *Archaean Time.*

When, however, life does once appear, it is, with all its variety, well-nigh the same in all the older rocks. In the most widely separated localities the same types recur in rocks of the same age, and this it is that furnishes us with the key to the succession of deposits. From the time when the oldest fossil-bearing stratum was deposited until now, the story of life-progress and development is told by rocks with enough clearness not to be misunderstood. Local differences of condition have probably always prevailed, as they do now, but the same types of organisms have always lived at the same time over the entire globe, so that their remains serve as sufficient criteria for the correlation of the strata which contain them. The sequence of life-forms, once made out, gives us, for the whole earth, the means of fixing the order of deposits, even when this is most profoundly disarranged by foldings of the strata in mountains, or by other earth movements.

Geologists distinguish three principal divisions in the history of life, as read in the record of the rocks. During the earliest of these great time-divisions archaic forms of life flourished—uncouth fishes, mollusks, crustaceans and tree-ferns—very unlike those now extant. On this account this is known as the period of most ancient life, or the *Paleozoic Time.* To this succeeded a vast lapse of ages, when enormous reptiles predominated, associated with other life-types more like those

which now inhabit the globe. To this division is given the name of middle life, or *Mesozoic Time*. Finally, living things began to assume the form and appearance with which we are familiar; so that this last grand time-division, which includes the present, is designated as the period of recent life, or *Cenozoic Time*.

Each of these three grand divisions of geologic time is, in its turn, subdivided into shorter periods, called *ages*, each characterized by its own peculiar types of life. And the different ages are themselves separated into *periods* and *epochs*, which vary more or less in character according to the regions where they are developed. Hence each of these periods and epochs is usually designated by a local name.

In Maryland we have not merely representations of all the great time-divisions of geology, but of each of the subordinate ages as well; while many of the best characterized periods and epochs may also be distinguished. This may be best appreciated by referring to the accompanying geological map (in pocket at end of the volume). An examination of the legend of this map shows that there are distinguished eight pre-Paleozoic, thirteen Paleozoic and eight post-Paleozoic formations. The number of separate horizons is in reality much greater than this, as will be shown in the succeeding descriptions; but upon a map of this scale (eight miles to the inch), it has been necessary to unite the less important or less developed formations with those which cover considerable areas or which show very marked lithological differences.

As has been pointed out in the topographical description of the State in the preceding chapter, Maryland's territory falls naturally into three sharply contrasted provinces; an eastern Coastal Plain surrounding the Chesapeake, a central Plateau and a western region of Mountains. These main topographical divisions are capable of further differentiation into topographic belts, which also differ in geological composition and structure. Thus the Coastal Plain is divisible into a lower eastern, and a higher western portion, usually known as the "Eastern Shore" and "Southern Maryland." The central plateau is also twofold, being divided into an eastern and western slope by its median watershed, known as Parr's Ridge. The mountains of Maryland are a narrow strip across the great Appalachian System, which as Whitney has shown, are divisible through their whole extent from New York to Alabama into three parallel belts. On the east is the Blue Ridge and Great Valley, in the centre the narrow, sharply parallel ridges of the Appalachians proper, and on the west the broad plateau and gentle folds of the Alleghanies which merge gradually into the plains of Ohio.

These seven subordinate topographical divisions of Maryland are each composed of a distinct series of geological formations. This may be readily perceived by examining the geological map and section. The dis-

tinction of formations is least pronounced in the two divisions of the Coastal Plain, although the NNE-SSW trend of the nearly horizontal beds produces a predominance of the mesozoic and early tertiary beds in the western, and of the late tertiary in the eastern section. In the Piedmont Plateau, as the area between the Coastal Plain and mountains is called, the two-fold character of the province, geologically, is very marked. On the eastern side of the central water-shed (Parr's Ridge) we have a sequence of highly crystalline rocks, in large part igneous in their origin, which represent the remains of a vast Archaean continent whose detritus furnished most of the materials of which the Paleozoic sediments were made. On the western side of the median ridge the rocks are only partly crystalline, and represent the greatly folded and metamorphosed beds of early Paleozoic time. Along the western edge of this plateau, beyond the Monocacy river, is the Frederick Valley, composed of the blue Paleozoic limestone (Trenton), in part overlain by the red sandstone of Mesozoic age (Newark). The three-fold division of the mountain system corresponds approximately to a three-fold division in the sequence of Paleozoic strata. The Blue Ridge and great valley are made up of Cambrian and Lower Silurian beds, in places so displaced and eroded as to expose the Archaean floor in which they rest. The Appalachians proper are made up of sharply folded Upper Silurian and Devonian strata, each easily recognized by its characteristic life-forms; while the Alleghany Plateau is mainly composed of the more gently folded late Devonian and Carboniferous deposits carrying the priceless coal seams of the Cumberland basin.

Such in brief is the distribution of geological formations and their connection with the easily recognized types of surface configuration occurring within the State. The sequence is of remarkable completeness, and of great interest on account of the types of country and of soil which the various horizons produce. An attempt will now be made to trace out somewhat more in detail the geological history of each of our three great provinces—plateau, mountains and coast plain—beginning with the most ancient. Those who desire to follow out this history will find a constant reference to the geological map of service.

## THE PIEDMONT PLATEAU.

*General Description.* For the adequate comprehension of the crystalline rocks occurring within the limits of Maryland, some broader knowledge is necessary of the geology of that great Piedmont belt of which it is a fragment. A brief general characterization of this province must therefore precede the more detailed descriptions of the local geology about Baltimore.

Along the eastern flank of the Appalachian and Green Mountain uplifts there is a belt of highly crystalline or semi-crystalline rocks

which extends from Alabama to Maine, and even farther north. This zone attains its maximum width (300 miles or more) in the Carolinas. Toward the north it narrows and is nearly buried beneath the Trias in New Jersey; beyond New York, however, it suddenly broadens, so as to embrace the larger part of New England. Within this whole province the rocks are so crystalline as to make fossils rare, while their structure presents some of the most puzzling problems in American geology. Many theories have obtained regarding the age and origin of the strata, but it is only within very recent years that elaborate and detailed work has begun satisfactorily to solve the mystery. In New England the entire sequence of Paleozoic sediments is found in more or less completely metamorphosed form, with occasional areas of more ancient crystalline rocks (Archaean) protruding through them, while they are cut by a variety of eruptive masses.

South of New York the crystalline belt acquires a more homogeneous character, both structurally and topographically, which fact, together with its position at the eastern foot of the Appalachian system, has occasioned its designation as the Piedmont Plateau.

Topographically the Piedmont plateau may be considered to begin in Maryland* as the eastern base of Catoctin mountain, a sharply defined ridge of nearly uniform height (1,500 ft.) extending from Point of Rocks on the Potomac, northward to the Pennsylvania line just west of Emmitsburg. East of the Catoctin ridge nearly three thousand square miles of surface are exposed within the State before the overlap of clays and gravels belonging to the formations of the Coastal Plain are encountered. Geologically, however, the western boundary of the Piedmont belt in Maryland must be drawn considerably farther east, if, as is usual, we wish to confine this term to rocks of undetermined age.

We may roughly outline the Piedmont region proper in Maryland as a trapezium, bounded on the north by the State line, on the east by the Baltimore and Ohio railroad from Wilmington to Washington, on the south by the Potomac, and on the west by the Monocacy river. The surface of this area is nearly level, but it slopes very gently from a median water-shed, known as Parr's Ridge. The region has been so recently elevated that its streams are still excavating narrow precipitous channels.

The rocks composing the Maryland portion of the Piedmont Plateau are divisible into two distinct classes. The members of one of these classes are all completely crystalline, and, whatever was their origin, they now retain no certain evidence of clastic structure. These rocks are confined to the *eastern* portion of the plateau province and disappear beneath

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* See "The Petrography and Structure of the Piedmont Plateau in Maryland," by George H. Williams. *Bull. Geol. Soc. Am.*, vol 2, pp. 301-322 and map, 1891.

the overlying deposits of unconsolidated sand, gravel and clay, which compose the Coastal Plain.

The second class of Piedmont rocks are semi-crystalline, and, while they have been subjected to a certain amount of metamorphism and alteration, they still plainly show that they were once sediments of an ordinary type. While as yet no fossils have been found in them, they are not more altered than similar formations which in other localities have yielded fossils, so that there is every reason to suppose that their age will subsequently be definitely determined on palaeontological evidence. While these semi-crystalline rocks are principally confined to the western half of the Plateau region, there are isolated areas of them within the holocrystalline belt, which appear to be much younger, but which have been protected from removal by being folded in among the gneisses.

The line separating these two divisions of the Piedmont plateau, which we shall hereafter designate as the semi-crystalline (western) and holocrystalline (eastern) areas, is not coincident with the crest of Parr's Ridge, but lies on its eastern flank. Commencing in the south near Great Falls on the Potomac, it passes slightly west of Rockville and of Hood's Mills, then through Westminster on the Western Maryland railroad, and thence by a north-northeastward course to the Pennsylvania line. Further eastward there is a large area of the semi-crystalline schists in Harford county, surrounding the Peach Bottom and Delta roofing slates. These appear to be infolded in the gneisses, and are probably connected with the area near Finksburg by a narrow tongue passing the Northern Central railroad at Whitehall.

The most striking feature in the structure of the Piedmont Plateau is its radiating or fan-like structure, and the fact that the vertical strata forming the axis of this fan follow a direction neither parallel to, nor coincident with, the boundary between the crystalline and semi-crystalline rocks. (See section on the geological map.) These two lines start from the same point on the Potomac (Great Falls), but diverge more and more toward the north. The fan, therefore, while its axis is throughout composed of semi-crystalline rocks, has its western flank made up of the least crystalline, and its eastern flank of the most crystalline portion of the Piedmont region.

*Eastern Division.* The various rock formations composing the eastern or holocrystalline division of the Piedmont Plateau, cross Maryland from the southeast corner of Pennsylvania and the north end of Delaware in a general southwest direction. Their course is, however, not a straight one through the State, but forms a double curve, whose south side is convex on the east and concave on the west. This curve corresponds to the great westerly bend in the course of the triassic sandstone and folded Paleozoic beds of eastern Pennsylvania. It is, of course, much

less distinct in the highly crystalline rocks of the eastern Piedmont region, but that its presence can be traced at all amid the varied and complex structures of these very ancient rocks, is welcome evidence that at least the final impress was imparted to their strike by the great Appalachian folding. The convex or eastern branch of this curve may be most distinctly traced on our map in the belts of marble north of Baltimore, which, near Towson, turn from a southwest direction to a trend directly west through the Green Spring valley. Toward the southwest, these same marble belts turn again to the south-southwest, as do all the other rocks with which they are associated, and this course they hold into Virginia.

There is abundant evidence that these structural features of the eastern Piedmont region are not, however, the only ones which belong to these rocks, but that their present metamorphism and complexity must be accounted for by assuming that they have been subjected to several successive periods of disturbance.

The rocks composing the holocrystalline portion of the Piedmont Plateau in Maryland are petrographically divisible into six distinct types. Three of these are of undoubtedly eruptive origin, and may be designated according to their chemical and mineralogical composition, as *gabbro*, *peridotite* or *pyroxenite* and *granite*. The three remaining types—*gneiss*, *marble* and *quartz-schist*—are completely crystalline, and therefore exhibit no certain traces of clastic structure.

The prevailing rock over the entire holocrystalline area is the gneiss. It enters the State from the north in a very wide band, completely surrounding the Delta Peach Bottom slate area, but its breadth rapidly contracts toward the Potomac. The remarkably irregular forms of the marble areas, which are intercalated in the gneiss complex, show how intricate the stratigraphy of the latter really is. Much of its apparent simplicity is due to the obliteration of its true bedding through secondary foliation.

On the geological map which accompanies this volume, there are five distinctions made between the highly crystalline rocks which compose the eastern part of the Piedmont Plateau. The quartz-schist, with its characteristic muscovite layers and stretched black tourmalines, is included with the prevailing gneiss, of which it forms one of many varieties. This schist is nearly free from feldspar, and is therefore hard and resistant. It forms a prominent elevation along the south side of the Green Spring and Mine Bank limestone valleys, known as "Setter's Ridge," and occurs at many other localities in Baltimore and Howard counties, generally in intimate association with the white marble.

The Maryland gneisses themselves embrace a great variety of types, which range from granitoid aggregates of feldspar and quartz, on the one

hand, to nearly pure mica or hornblende schists on the other. All of these also show considerable structural variation in their coarseness of grain, the perfection of their parallel arrangement, etc.

The gneiss is sometimes quite constant in character for considerable distances, but more usually it consists of a succession of differently constituted layers.

In spite of a frequent persistence of strike and dip, the gneiss everywhere shows that it has been subjected to intense and repeated dynamic action. This is apparent in the large features of its structure, in its greatly crumpled, gnarled and twisted character, and in the profound metamorphism, amounting to almost complete recrystallization, which has gone on within it. No certain traces of clastic origin have ever been detected in the Baltimore gneisses, although their sedimentary character may be inferred from their rapid alternations of beds of different composition, and from the nature of other rocks intercalated in them, like the marbles and quartz-schists. In the continuation of the same rocks southward to the neighborhood of Washington evidences of a conglomeratic character have also been observed.

The color of the more massive gneisses varies from white to a dark grey or blue. The more micaceous and hornblendic varieties are dark brown or green. The mineral composition and structure is quite normal for gneisses.

Superficial exposures of the gneiss are very rarely fresh. This widespread decay extends also for a considerable distance below the surface, at least in an incipient form, as may be seen from the very rapid disintegration in road and railway cuttings, of rock hard enough to be blasted out.

The marbles of the eastern plateau region are the only highly crystalline rocks of sedimentary origin which are separated on the geological map from the gneisses. They differ from all the other marbles and limestones of Maryland in being much more coarsely and perfectly crystalline. In chemical composition they vary from nearly pure calcium carbonate to a dolomite with 40 per cent. and over of magnesium carbonate. They have lost all evidence of an originally clastic structure through recrystallization, and they now have their impurities crystallized into silicates, like mica (phlogopite), tremolite, tourmaline, pyrite, scapolite, etc., which are frequently arranged in more or less parallel layers representing old bedding planes.

These highly crystalline marbles are of the same age as the gneisses, and are infolded with them. In consequence of their greater solubility, they have been easily removed, and now occupy depressions like the Green Spring, Worthington, Mine Bank, Dulany's and other valleys which are sharply bounded by the surrounding ridges of gneiss.

The three types of eruptive rocks, which are distinguished on the geological map in the eastern plateau region, have all broken through and have more or less modified the gneisses, and are hence younger than these rocks. The intense dynamic action, which has produced such complete recrystallization in the banded complex, has likewise greatly metamorphosed the eruptive rocks, and yet not enough to obliterate their original character. Each type exhibits several chemical or structural facies dependent on the original differentiation of the magma or upon conditions of solidification, and to these must be added other varieties due to subsequent metamorphism.

The oldest, as well as the most extensive of the three eruptive rocks which so abundantly intrude the gneiss complex is the gabbro. Of this there are three main areas in Maryland—the Stony forest area of Harford and Cecil counties; the great belt or sheet which extends from north of Conowingo, on the Susquehanna river, in a south-southwest direction to Baltimore city, and the irregular intrusive area which is mainly developed to the west of Baltimore, but extends thence as far south as Laurel.

For detailed information regarding this rock and the products of its metamorphism, reference must be made to the text and plates of two memoirs devoted to its description.* It is a rather fine-grained granular aggregate of hypersthene, diallage, plagioclase (bytownite) and magnetite, with varying amounts of apatite and brown compact hornblende. It is usually, when unaltered, massive, dark in color, and heavy.

Some varieties are of a pale buff color, but are rich in magnesia, thus forming transitions to the peridotites and pyroxenites; other modifications are rich in alumina, producing highly feldspathic rocks, while others have an excess of silica in the form of blue quartz.

The action of pressure, which has caused the recrystallization of the gneiss and marble, is also very marked in the gabbro. It has caused its iron constituent, pyroxene, to change to another green mineral called hornblende. This has, in some cases, left the rock as massive as at first, and in other cases it has rendered it schistose. This resulting rock is called *gabbro-diorite*. The change has always been most complete where the mass of gabbro was smallest, as in narrow bands which frequently connect larger areas. This change is well shown along the Belair Road near Baltimore.

The next eruptive rocks in point of age are the basic magnesian silicates, peridotite or pyroxenite, and their alteration products, serpentine and steatite. All these are represented with a single color on the map. These are intimately associated with the gabbros, but occur most abund-

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*"The Gabbros and associated Hornblende Rocks occurring near Baltimore, Md.," by George H. Williams. *Bulletin of the U. S. Geological Survey, No.* 28, Washington, 1886.

"The Gabbros and associated Rocks of Delaware," by F. D. Chester. *Ibid*, No. 59, Washington, 1890.

antly toward the western edge of the crystalline region. They do not occur in as large masses as the other eruptive rocks, but occupy numerous small areas like the "Bare Hills," "Soldier's Delight," and many others which it is unnecessary to enumerate. In Montgomery County the serpentine is also developed in the semi-crystalline schists of the western plateau district.

The two main types of these rocks in their unaltered condition consist of pure pyroxene (*pyroxenite* or *websterite*) or of pyroxene in association with olivine (*peridotite* or *lherzolite*). These rocks have already been so thoroughly described by the writer in another place that no repetition is necessary here.*

These two types of eruptive rocks, pyroxenite and peridotite, are peculiarly subject to alteration, which is not, however, decomposition. Briefly it is this: the pyroxene, when it occurs alone, tends to pass into secondary hornblende, and this in turn gives rise to talc. This is the origin of the extensive beds of steatite in eastern Maryland and Virginia. The talc is always mixed with more or less pale fibrous hornblende (tremolite) and chlorite.

When, as in the peridotite, olivine accompanies the pyroxene, especially if it is bronzite, the rock tends to form serpentine instead of talc. The serpentine also contains secondary hornblende formed from the diallage.

The youngest intrusive rocks which break through the gneiss are the granites. They form large masses at Port Deposit and Havre de Grace, on the Susquehanna River; also near Joppa and to the north of Towson; at Woodstock and Sykesville; at and south of Ellicott City, and at several localities near Washington. The granites are so like the the surrounding gneisses in chemical, as well as in mineralogical composition, that where they have been greatly foliated through dynamic action, it becomes a matter of no small difficulty to distinguish them.

These rocks are as a rule, *biotite-granites*, of medium grain and remarkably compact and homogeneous texture. They sometimes carry a considerable quantity of muscovite (Guilford), and are noticeable for the large and constant proportion of allanite which they contain. This mineral is surrounded by a parallel growth of the isomorphous epidote, as described by Dr. W. H. Hobbs†

Variations in the structure of the granites are due to the development of porphyritic crystals, as at Ellicott City and along the road from Meredith's Bridge on the Gunpowder River to Cockeysville. Other

*"The Non-feldspathic Intrusive Rocks of Maryland and the Course of Their Alteration," by George H. Williams, *American Geologist*, July, 1890.

†On the Paragenesis of allanite and epidote as rock-forming minerals. *Am. Jour. Science*, 3 ser., vol. 38, pp. 223-228. Sept., 1889.

structural facies are due to secondary features, like foliation, produced by dynamic agencies.

The gneisses of the Baltimore region are penetrated with a great abundance of dykes, veins and "eyes" of the coarse-grained granite, known as *pegmatite*. The other crystalline rocks of the region, although to a less extent, contain the same material.

Within the Eastern Plateau region the pegmatite appears to have been produced in two ways. At least we seem compelled by direct evidence to assume that certain occurrences of it are true eruptive dykes, genetically related to the normal eruptive granites already described. For other occurrences an aqueous origin, by segregation, appears more probable, although the proof is not as good as in the former cases.

The only other type of eruptive rock occurring in the eastern division of the Piedmont Plateau in Maryland is a long dyke of unaltered diabase, which preserves all the features of the normal triassic diabase occurring further west, and which is therefore referred to this age.

The area of semi-crystalline slates and schist extending from Delta in Harford County to Finksburg, belong geologically to the western division of the Piedmont Plateau, and will therefore be considered with the similar rocks of this region in the succeeding section.

*Western Division.* As has been already stated in the general description of the Piedmont Plateau (page 65), the western slope of Parr's Ridge, as far as the Monocacy River, is composed of little crystalline or semi-crystalline rocks of sedimentary origin. These rocks are almost unaltered along their western margin, where they present the same characters as the sandstones, slates and limestones of the Blue Ridge and Frederick Valley, where their age has been determined by fossils. As they approach the axis of the "fan," however, which has been shown above (page 65) to be one of the principal features in the structure of the Piedmont Plateau (see geological section on the map), these schists become more crystalline. Here they stand nearly vertical, and it is here that the dynamic action has been at a maximum, as is shown by the greatly contorted condition of the schists and by the abundant development of new minerals within them. The slates have become roofing-slates or chlorite and hydromica (sericite) schists, often full of ottrelite, rutile, biotite and other new constituents. The limestones have become compact, hard, fine-grained marbles. The geological position of these rocks has not yet been positively proved by fossils, and they are, therefore, designated on the geological map by a different color. Nevertheless, there is no reasonable doubt that they are Cambrian sandstones, Trenton limestones, and Hudson River shales in a more or less completely metamorphosed form.

If we follow the succession of strata eastward from Catoctin Mountain, which bounds the Piedmont Plateau upon the west, we find, above the hard Cambrian sandstone, a little limestone, which, however, is immediately buried beneath the overlap of red sandstone. This blue limestone, whose fossils show it to be of Lower Silurian (Trenton) age, soon, however, emerges from beneath the overlying and unconformable Triassic (Newark) sandstone as a series of considerably folded beds, which are succeeded on the east and apparently overlain by carbonaceous and hardly altered shales. These are like those which occupy a similar position above the same limestone farther westward. Still beyond, there follow with the same easterly dip, the thick beds of sandstone which compose Sugarloaf mountain. These thin out toward the north to a few insignificant sandstone patches, while toward the south they soon disappear beneath the Newark transgression. The Sugarloaf sandstone passes, on its eastern side, upward by a gradual transition through shaly layers into sandy slates, and these again into the succession of sericite and chlorite schists, which compose the mass of the semi-crystalline area. Beneath the sandstone the shales are more disturbed, and, as there is here no such transition, this surface represents a fault or thrust. The massive sandstone strata of Sugarloaf Mountain form a monocline with a rather gentle dip toward the east. The overlying sandy slates have the same inclination, and appear to be but little altered. When, however, these rocks are followed across their strike toward the east, they are seen to become more and more contorted, cleaved and faulted.

Closely folded and puckered layers are frequent, and the secondary cleavage approaches nearer and nearer to the vertical. This succession is well displayed along the main stem of the Baltimore and Ohio railroad, between Araby and Hood's Mills. The alteration and recrystallization of these rocks, attendant upon the increasing disturbance to which they have been subjected, becomes so great that it is not always easy to locate exactly the line of contact between them and the underlying and more ancient crystallines of the eastern Piedmont region.

The deposit of red sandstone and shale, together with the limestone breccia ("Potomac marble" or "calico rock"), which covers a portion of the Frederick valley, lying along the east base of Catoctin Mountain, and spreading over a much wider area toward the north, represents an era geologically much more recent than any we have thus far considered. The strip of these red rocks, which here cross Maryland, represents a formation laid down in estuaries after the Appalachians had been elevated. Through all Paleozoic time, the sediments of which these mountains are formed, were accumulating. At the end of this time they were folded into a lofty range, at whose base the sandstone was deposited. The fossils and stratigraphical relations of this sandstone, known as the "Newark

BLUE RIDGE TOPOGRAPHY. POTOMAC RIVER GORGE AT HARPER'S FERRY

formation," show its geological position to be at the end of the first age of Mesozoic time or the Triassic. Its features are remarkably persistent along the whole Atlantic border. It occurs on the east side of the Bay of Fundy, it fills the valley of the Connecticut river, it runs in a wide band from southern New York, across northern New Jersey and Pennsylvania, into Maryland, south of which it reappears in large, disconnected areas in Virginia and the Carolinas. The formation is throughout a red sandstone with intercalated layers of shale, and intersected by dykes of a trappean volcanic rock (diabase), which also frequently forms interbedded sheets or flows. In Maryland the red sandstone dips at a gentle angle toward the mountain, and its beds, therefore, lie nearly perpendicular to the strata of limestone below them, which dip steeply to the east. This is technically known as an "unconformity," and indicates that the sandstone is younger than the action of the violent forces which have disturbed the older rocks. A somewhat exceptional member of the Newark sandstone in Maryland is the highly-colored conglomerate or breccia, composed of bluish pebbles of limestone, connected by a red cement, and known as Potomac marble. This rock is well exposed at Washington Junction, near the Potomac river, and near Frederick. The igneous rocks, of the age of the Newark sandstone in Maryland, form a continuous area, of considerable extent, near the Pennsylvania line, north of Emmitsburg, whence two long dykes extend southward. (See geological map.) The western of these is the most important. It can be traced entirely across the State, as a low but clearly-defined elevation, known as "Ironstone Ridge." It cuts the sandstone, but for a considerable distance it lies outside of the sandstone now remaining, and intersects the older limestone, shale, and sandstone. The rock is compact, hard, and black; it is very heavy, but contains no iron of economic value. It weathers into a light red clay soil.

### THE APPALACHIAN MOUNTAIN REGION.

The section made by Maryland across the Appalachian system, between the Frederick valley and the western line of Garrett county, presents an almost complete and unbroken sequence of the sediments which accumulated during the entire duration of Paleozoic time. The oldest of these sediments are toward the east and the youngest toward the west, although the more or less abrupt folds into which they were thrown when they were raised into a mountain-chain have since been so cut off by erosion as to show a repeated succession of strata. (See geological section on map).

The beds of sediments (limestones, sandstones and shales) which form the Appalachians, were deposited in a wide, long trough which once extended over the region now occupied by these mountains. This

trough was undergoing gradual depression through the whole of Paleozoic time, until about 40,000 feet of conformable beds had accumulated in it, mainly as the debris of a continental mass lying to the east. This vast accumulation was, at the end of the coal age, so compressed as to be forced up into a lofty range of mountains. The present Appalachians are merely the remnants of this range worn down by waste through many successive periods. The compressive force which raised these mountains acted from the east toward the west, hence the most intense disturbance is always observable on the eastern side of the range, and this dies away gradually into the central plains. A second result of this action from the east is that all the folds are tipped toward the west, and all the great faults show a thrust in the same direction.

As has been already pointed out, the mountain system of Maryland is divisible into three distinct portions, an eastern range of faults—the Blue Ridge; a middle range of steep folds—the Appalachians proper; and a western plateau of gentle folds—the Alleghanies. The prevailing strata in these three divisions are likewise distinct, being oldest in the eastern, intermediate in the central, and youngest in the western region.

*The Blue Ridge and Great Valley.* This division in Maryland extends from the Frederick valley to the foot of North Mountain. It is composed of the oldest Paleozoic strata, embracing the Cambrian and Lower Silurian or Ordivician deposits. On the geological map these are subdivided into only three horizons—Cambrian, Trenton and Hudson River.

The oldest, or Cambrian, consists mainly of hard sandstone, which forms the summits of the Blue and Catoctin mountains. Mr. Arthur Keith, of the United States Geological Survey, has made five minor divisions in the Cambrian rocks of the Blue Ridge of Maryland*, as follows:

5. *Cambrian Limestone:* blue-banded and mottled limestone, with thin beds of sandy shale and limestone conglomerate; Cambrian fossils.
4. *Antietam Sandstone:* fine grained white sandstone, with scolithus and Lower Cambrian fossils.......................... 250 ft.
3. *Harper's Ferry Shales:* Grey sandy shales, with same sandstone beds, scolithus and Lower Cambrian fossils........... 1,200 to 1,500 ft.
2. *Weaverton Sandstone:* Gray massive sandstone, often coarse and feldspathic..... .............................. 1,000 to 1,200 ft.
1. *Loudon Shales*, grey and black slaty shales .................400 feet.

This sequence grades upward through its top member into the lower Silurian limestone (Trenton-Chazy) of the Cumberland Valley. The sandstones are cut by a number of great faults along which they have been

* American Geologist, vol. X., Dec. 1892, p. 365.

THE CUMBERLAND VALLEY, LOOKING WEST FROM THE CREST OF THE BLUE RIDGE

thrust forcibly toward the west, and thus often overlie rocks which are in reality younger than themselves. This fact has made the deciphering of the structure of this part of the Blue Ridge difficult, and it has only recently been finally settled through the discovery of Lower Cambrian Fossils by Mr. C. D. Walcott, of the U. S. Geological Survey.*

From all the central portion of the Blue Ridge in Maryland the sandstones and shales have been removed, and the older crystalline rocks upon which they rest are revealed. These consist in part of ancient volcanic rocks and in part of granites. The volcanic rocks are of two types, one corresponding to the acid lavas (rhyolite) and the other to the basic (basalt) of recent volcanic regions. These rocks are even better developed in the extension of the Blue Ridge into Pennsylvania, where they have been recently studied by the writer.† Both the volcanic rocks and the granites, which are confined to the Middletown Valley and to the region between Harper's Ferry and Weaverton, have been considerably altered by the intense pressure to which they have been subjected. This has so completely foliated them that until recently they have been regarded as sedimentary slates.

The broad and fertile Cumberland or Hagerstown valley, which stretches from the Blue Ridge to North Mountain, belongs geologically to the former. It is mainly composed of the blue Silurian limestone, which also underlies the Frederick Valley, although none of the overlying red sandstone of triassic age occurs here. On the other hand there are long, narrow areas of shale infolded with the limestone, which belong to the next younger or Hudson River division of the Silurian age.

As has been already indicated, the rocks of the western or semi-crystalline portion of the Piedmont Plateau, east of the Blue Ridge as far as the eastern flank of Parr's Ridge, are the same as those forming the Blue Mountain and Great Valley, but in a more or less altered condition. The limestones of the Hagerstown or Frederick valleys are the same, as has been shown by their fossils.‡ The Sugar-loaf sandstone is the same as that of Catoctin Mountain, while the slates above the limestone, which are largely metamorphosed into phyllites, are of Hudson River age. This horizon contains the great roofing-slate quarries along the northwest edge of the Great Valley in eastern Pennsylvania and New Jersey; but in southeastern Pennsylvania, Maryland and Virginia the roofing slates occur in the more eastern metamorphic belt, as at Peach Bottom, Delta, Ijamsville, Quantico and Arvon. At the latter place, near the James River, Va., Mr. N. H. Darton has recently found well preserved crinoids of Hudson River age.§

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* American Journal of Science, 3d ser., Vol. 44, Dec., 1892; p. 469.

† American Journal of Science, 3d ser., Vol. 44, Dec., 1892; p. 482.

‡ C. R. Keyes, Johns Hopkins University Circulars, No. 83.

§ American Journal of Science, 3d ser., Vol. 44, July, 1892; p. 50.

*The Appalachians Proper.* This province of the Appalachian system includes the central portion of the mountains, which in Maryland lies where the State is narrowest, between the western edge of the great valley (North Mountain), and Dan's Mountain west of Cumberland. Throughout its entire extent this province exhibits in the most characteristic manner the typical Appalachian structure as made out by Rogers. It is traversed by narrow and remarkably parallel ridges which succeed one another *en échelon*, and which owe their existence to the regular folds into which the strata have been thrown.

Within Maryland's territory the province of the Appalachians proper is divisible into three belts: the two outer ones being quite closely folded, while the middle arc is composed of beds whose undulations are comparatively gentle.

The most easterly of these three divisions may be called the North Mountain belt. It is about fifteen miles wide, and extends from the western edge of the Hagerstown Valley to the western slope of Tonoloway Hill. Within this distance the strata are so closely folded that almost all the Silurian and Devonian beds are brought repeatedly to the surface. The portion of North Mountain itself which lies within the limits of Maryland is a great anticlinal of Medina Sandstone (No. IV), whose central portion has been removed toward the north, exposing the soft Hudson River shales in Blair's Valley between its two sandstone flanks. Toward the south, however, the anticlinal so rapidly narrows, that most of the overlying beds, Clinton (V), Helderberg (VI), Oriskany (VII), and Hamilton (VIII), are crowded nearly against the great fault separating the valley from the mountain, before the Potomac is reached.

On the west side of North Mountain succeeds the synclinal valley of Licking Creek, composed mainly of Hamilton-Chemuing shales (No. VIII), but exposing also the overlying Catskill sandstone (No. IX) in its southern portion. Into this Hamilton-Chemuing area projects from the north the anticlinal loop of older strata, which surrounds the narrow valley of Trenton limestone in Fulton County, Pa., known as the McConnellsburgh limestone cove. On the west side of this anticlinal loop, which wholly disappears before reaching the Potomac, the Hamilton-Chemuing strata are less disturbed, and compose most of the surface as far as a point just west of Hancock, where the anticlinal fold of Tonoloway Hill commences. East of Hancock the Hamilton-Chemuing beds (No. VIII), are, in part, overlain by two thin strips of the younger Catskill sandstone. Tonoloway Hill forms the western member of the North Mountain belt. It is an anticlinal ridge of Clinton-Niagara (No. V), flanked on each side by narrow bands of Helderberg limestone (No. VI) and Oriskany sandstone (No. VII). The ridge soon dies out as

APPALACHIAN STRUCTURE. FOLD IN THE SALINA SANDSTONE AT ROUND TOP 3 MILES SOUTHWEST OF HANCOCK

a loop in Fulton County, Pa. At Round Top, where the Potomac River cuts into Tonoloway Hill, three miles southwest of Hancock, the folds of the Helderberg limestone, and the underlying layer of red sandstone (Salina), are exhibited in a perfection rarely excelled anywhere in the mountains.

The middle of the three belts of the Appalachian province proper in Maryland lies between Tonoloway Hill and Warrior's Ridge, which rises on the west side of Town Creek. It embraces the three ridges known as Sideling and Town Hills and Polish Mountain, with their intervening valleys. The strata in this belt are almost altogether Devonian, and their comparatively gentle undulations offer a contrast to the sharper folds on both the east and west sides. The surface within this belt is, for the most part, composed of Hamilton-Chemuing strata, frequently capped by remnants of the Catskill sandstone. Along the crest of Sideling Hill a strip of the still younger subcarboniferous sandstone (No. X) is left. The only older rocks are found in the narrow anticlinal loop of Oriskany and Helderberg, which projects northward across the Potomac, opposite the mouth of the South Branch.

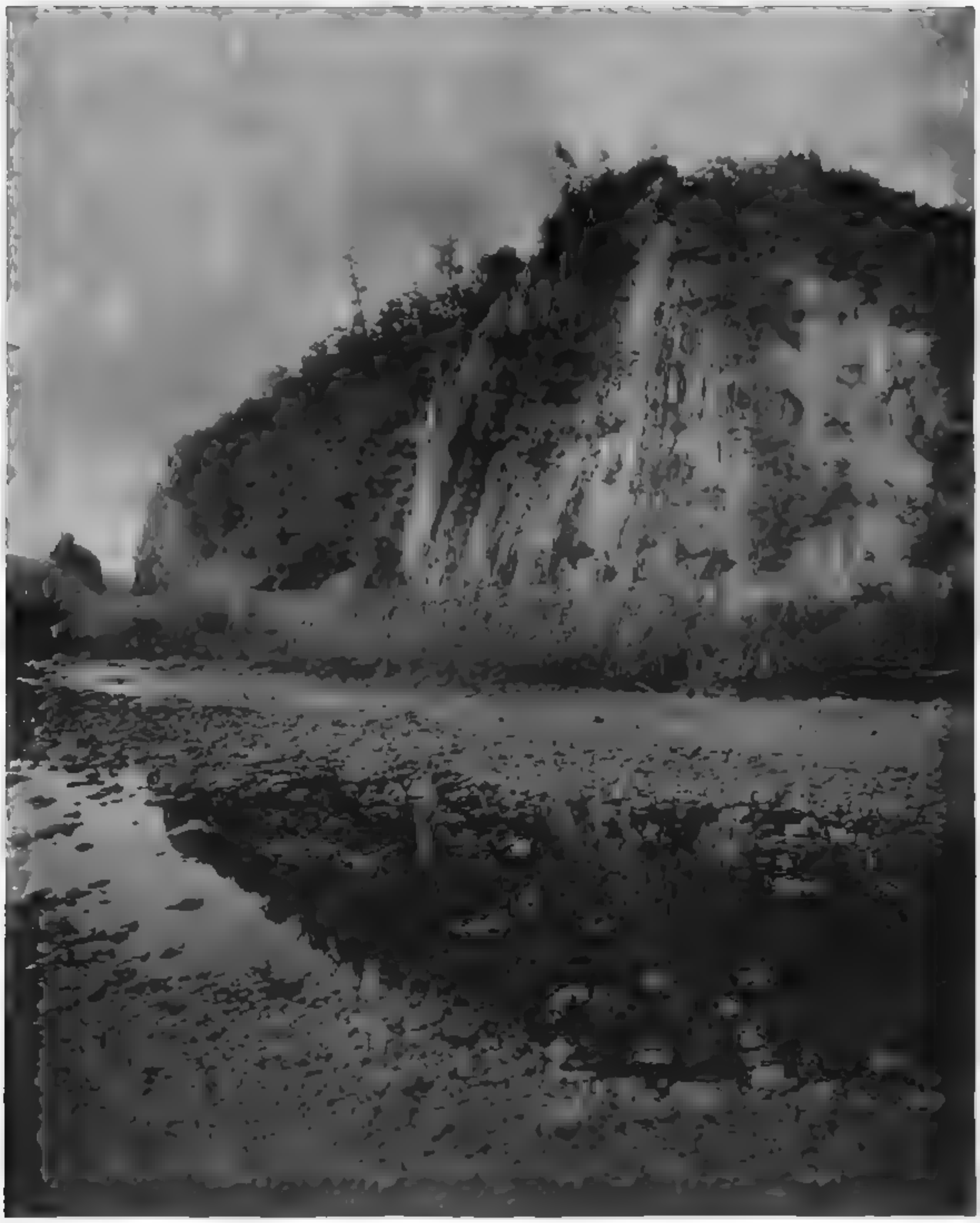
The third of the belts of the Appalachian province proper in Maryland is closely folded like that on the east. It occupies the area between Flintstone and Dan's Mountain, and consists of three parallel and sharply anticlinal ridges—Warrior's, Martin's and Will's Mountains—whose axes consist in each case of hard Medina sandstone (No. IV). These folds soon die out toward the south; but the sandstone remains at the surface longer in the western ridge (Will's Mountain) than in the middle one, and longer in the middle one (Martin's Ridge) than in the one farthest east. Hence each range grows longer as we pass westward, while the younger strata from Clinton to Chemuing (Nos. V–VIII) encircle their southern ends and fill the intervening valleys. (See map.)

Each of these three folds is steepest on its western side, as is the rule of Appalachian structure. Indeed, it is hard to find a more instructive or typical section in this whole range than is seen in passing from the Hamilton shales on the east side of the city of Cumberland, through the "Narrows" and across the valley of Will's Creek toward Dan's Mountain. The sequence of Upper Silurian and Devonian strata is crossed three times, first with moderate dip up the gentle flank of Will's Mountain on the east, then closely compressed, plunging with nearly vertical dip down its steep western flank, and finally climbing again with more gentle dip the eastern slope of the front range of the Alleghanies. (See geological section on map.)

*The Alleghany Plateau.* The whole of Maryland west of Will's Creek belongs to the great plateau of the Alleghanies, which gently undulates across West Virginia and Pennsylvania into the plains of

Ohio. Maryland's portion of this plateau is a triangle which includes Garrett, and the western part of Alleghany county. From Will's Creek the country rises rapidly to the summit of Dan's Mountain (2,100 ft.), west of which it maintains a relatively high elevation to the western line of the State. The rocks are the youngest of the Paleozoic series—Upper Devonian and Carboniferous. They are sandstones, conglomerates and shales, with very little limestone, and carry near their top the seams of coal which give to this geological horizon its name, and make it, the world over, of paramount importance. These strata in western Maryland are bent into very gentle folds, and as the middle beds (Pottsville, No. XII) are the hardest, these have most successfully resisted the forces of erosion, and stand out in bold ridges. Between these are alternately flat anticlinal valleys of older rocks and synclinal valleys of younger ones, as is shown in the geological section.

There are two series of these ridges in western Maryland, which converge toward the south. Members of the eastern series trend southwest, while those belonging to the western series trend nearly south. To the first series belong Dan's, Great Backbone or Savage, and Meadow mountains; to the second series, Negro Mountain, Winding Ridge and Laurel Hill. The two innermost members of these converging sets, Negro and Meadow Mountains, as will readily be seen by reference to the map, unite above Oakland, and surround, as with a wall, the flat synclinal trough of carboniferous rocks around Grantville. On both sides of this basin are rugged upland valleys of hard sandstones—Catskill (No. IX) and Chemung (No. VIII). Since these rocks are all older than the mountain-forming conglomerate, they represent two flat anticlinal arches, whose former coverings have been worn away. South of the Grantville coal basin, these two valleys unite, forming the highlands, upon which stand Deer Park and Oakland. The great anticlinal V of upper Devonian strata in Garrett County, is flanked by the two central ridges of the two converging series—Great Backbone or Savage Mountain on the east and Winding Ridge on the west. These, like the ridges surrounding the central coal-basin, are capped and protected by the hard, resistant Pottsville conglomerate (No. XII), and each forms the rim of an external coal-basin. East of Savage Mountain is the George's Creek coal field, while west of Winding Ridge is the carboniferous basin of the Youghiogheny River. Geologically these are alike, and symmetrically arranged, but, economically, they are of very unequal importance. The Grantville and Youghiogheny coal basins are relatively small extensions of the vast Appalachian coal field, which reaches its maximum development farther west. Although the continuation of these areas northward into Pennsylvania becomes valuable, they carry in Maryland only the lower productive and barren coal measures which, unfortunately,



APPALACHIAN STRUCTURE VERTICAL ORISKANY AND HELDERBERG STRATA NORTHWEST OF CUMBERLAND

have not yet proved capable of being worked with profit in our State. Hence no mining operations are carried on in the two Garrett county coal basins.

The smaller coal area in western Alleghany County, on the other hand, lying between Savage and Dan's Mountains, contains extensive remnants of a former covering of the upper productive coal-measures (No. XV). These here carry a great 14-foot vein of semi-bituminous coal, and thus reach their highest development as regards quality and value. Thus this smallest in extent of Maryland's three coal fields becomes one of her greatest sources of wealth, as is explained more fully beyond, in the account of the coal industry.

### THE COASTAL PLAIN.

The area of lowland which borders the Piedmont Plateau upon the east passes with constantly decreasing elevation seaward, and has been already described under the name of the Coastal Plain. It is made up of geological formations of younger date than those found in the central and western portions of the State, and furthermore have been only slightly changed since they were deposited. Laid down upon the edge of the crystalline belt, when the sea stood near the eastern border of the Piedmont Plateau, these later sediments form a series of thin sheets, which are inclined slightly to the eastward, so that successively later formations are encountered in passing from the interior of the country toward the coast.

Oscillation of the sea floor, bearing its accumulated sediments, went on during the period of Coastal Plain deposition, and as a result the formations present along their western margins much complexity. At such points it is not uncommon to find intermediate members of the series lacking, so that the discrimination of the different horizons in the absence of fossils is often attended with great uncertainty.

The Coastal Plain sediments deposited after a long break in time between the red sandstones of the Triassic age, hitherto considered, and the lowermost of the series now to be described, complete the sequence of geological formations found represented in Maryland. From the time deposition opened in the coastal region to the present, constant sedimentation has apparently been going on, although at times unconformities appear along the landward margins of the different formations which, as already mentioned, indicate marked changes of level in proximity to the coast.

The formations of the Coastal Plain consist of the following:

| | | | |
|---|---|---|---|
| Cenozoic. | *Pleistocene* (Columbia). | | Formations of the Coastal Plain. |
| | *Pliocene* (Lafayette). | | |
| | *Miocene* (Chesapeake). | | |
| | *Eocene* (Pamunkey). | | |
| Mesozoic. | *Cretaceous* | Upper (Severn). | |
| | | Lower (Potomac). | |

*The Lower Cretaceous* (*Potomac*).—The Lower Cretaceous deposits directly overlie the crystalline rocks of the Piedmont Plateau, and are to a considerable extent formed of debris from the same, although a vast amount of material has been transported from the Appalachian Mountains beyond and become mingled with the waste from the former. The Lower Cretaceous, as well as later formations, has been derived from both the areas that lie to the westward. These materials were borne into the sea in great amounts, particularly during Lower Cretaceous time, when the forces of erosion were most active. On account of the downward tilting of the eastern margin of the old base-leveled surface of the plateau region and a corresponding elevation landward, the velocity of the streams and consequently their denuding and transporting power were accelerated. The sediments were scattered by rapid shore currents for great distances along the coast, and the alternating and irregularly deposited sands and clays give evidence of marked mechanical disturbances, while the fauna and flora indicate further that the conditions were probably brackish water, possibly estuarine in character.

The Lower Cretaceous, known along the middle Atlantic slope under the name of the Potomac formation* (Baltimorean and Albirupean, of Uhler†), is found extending northward to New Jersey, and the islands bordering the New England coast, while southward it extends along the eastern edge of the Piedmont Plateau to Georgia, and into the Gulf region, where it has been described under the name of the Tuscaloosa formation.

The deposits of the Lower Cretaceous consist chiefly of sands and clays, with gravels at certain points where the shore accumulations are still preserved. The sands and clays alternate, and show both a vertical and horizontal gradation into one another. The sand layers are seldom widely extended, being generally found as lenticular masses, which rapidly diminish in thickness from their centres. The attempts that have been made to divide the Lower Cretaceous into a lower sandy and upper clayey member, have not been altogether successful, since, in

* McGee, W. J., Three Formations of the Middle Atlantic Slope, *Amer. Jour. Sci.*, 3d ser., Vol. 35, 1888, pp. 126-143.

† Amer. Phil. Soc. Proc., Vol. 25, 1888, pp. 42-53.

SECTION ON MAULDEN'S MOUNTAIN, AT HEAD OF CHESAPEAKE BAY, SHOWING LOWER AND UPPER CRETACEOUS FORMATIONS.

different localities, at a corresponding position in the series, both sand and clay are found. Highly colored and variegated clays (iron ore clays of Tyson*) abound, however, in the upper portion of the formation, and have yielded large amounts of nodular carbonate of iron. Extensive diggings have been opened in the region to the southwest of Baltimore, and the ores extracted have been used in the furnaces of the vicinity.

The clays have also great value for pottery and brick-making, and a large part of the local materials so used come from this formation.

Beds of sand are found underlying the clays at Federal Hill and other points, while even larger deposits occur in the upper portion of the series on the Patuxent and Severn Rivers. At the latter locality the sands are of such thickness and purity as to be of considerable economic importance, and extensive diggings have been opened.

The width of outcrop of the Lower Cretaceous is about 15 miles in the centre of the State. Its marginal contact with the crystalline rocks is a jagged, irregular line, at times broken, while detached, isolated masses frequently lie to the west of the main area. Its eastern border is more regular than its western, but due to the unequal erosion of the country is more or less sinuous, reaching farthest eastward along the channels of the streams. The Lower Cretaceous extends from northeast to southwest across the State, the main body of the formation being found in Cecil, Harford, Baltimore, Anne Arundel and Prince George's counties. Upon the eastern shore of the Chesapeake it reaches into Kent county and along the Potomac into Charles county.

The fossils found in the deposits, although not as numerous or distinctive as might be desired, yet indicate beyond doubt the Cretaceous age of the formation. They consist chiefly of the bones of dinosaurian reptiles and leaf impressions. The former, found in Prince George's county, have been described by Professor O. C. Marsh,† of Yale University. The leaf impressions, many of which come from Federal Hill, Baltimore, have been studied by palaeobotanists, and an elaborate monograph has been published by Professor William Fontaine,‡ of the University of Virginia.

*The Upper Cretaceous* (*Severn*). The Upper Cretaceous, the existence of which in the series of geological formations found represented on the western shore of the Chesapeake had not been recognized previously, was investigated by the writer in 1888 and described shortly after in the Johns Hopkins University Circulars.§ A further account of the same was published shortly after by Uhler.‖ Darton,¶ in 1891, called

* First Rept. State Agricul. Chemist of Md., 1860, pp. 30, 42.

† Amer. Jour. Sci., 3d ser., vol. 35, 1888; pp. 89-94.

‡ U. S. Geol. Survey Monograph, vol. xv.

§ Johns Hopkins University Circulars, No. 69, pp. 20, 21.

‖ Maryland Acad. Sci., Trans., vol. I, pp. 11-32.

¶ Geol. Soc. America, Bull., vol. 2, pp. 431-450.

it the Severn formation, from the typical locality on the Severn River, in the vicinity of which the strata were first investigated by the writer. The occurrence of the Upper Cretaceous in a limited district on the eastern shore of the Chesapeake had been, however, earlier mentioned by Ducatel* and Tyson,† who gave brief descriptions of the same.

The Upper Cretaceous strata, where observed, rest unconformably upon the Lower Cretaceous, which, taken together with the marked change in the character of the deposits, renders the determination of their boundary line generally a simple matter.

The materials out of which the deposits of the Upper Cretaceous are formed consist of fine sands and clays, clearly stratified, and in the case of the clays often laminated. The clays and sandy clays are generally dark, often black in color. They are highly micaceous, indicating the crystalline rocks of the Piedmont Plateau as the source of the materials. The highly homogeneous and persistent character of the beds shows that deposition went on under similar and quiet conditions throughout a wide region of the sea-floor. In this respect the deposits of the Upper Cretaceous stand in marked contrast to those of the Lower Cretaceous, where every evidence of mechanical disturbance is present.

Certain constant lithological differences in the deposits of the Upper Cretaceous have been noted over wide areas. The lower portion of the formation is more highly carbonaceous, and thus darker than the upper beds, which are generally grayish or reddish in color. The lower portion is also more argillaceous and more frequently laminated than the upper, which is generally sandy.

The Upper Cretaceous is much more fully developed in New Jersey than in Maryland, and in the former State contains extensive beds of green-sand which are lacking in the Maryland strata, although glauconite, the chief constituent of green-sand, is found sparsely scattered through the deposits at a few points. To the south of Maryland the Upper Cretaceous does not appear again at the surface until North Carolina is reached, in which State and South Carolina, as well as throughout the Gulf, it is well developed.

In Maryland the Upper Cretaceous extends as a narrow band across Cecil and Kent counties, on the Eastern Shore, numerous fossils having been found at the head of Bohemia Creek and on the banks of Sassafras River. On the Western Shore it is found in Anne Arundel and Prince George's counties, characteristic fossils having been obtained by the writer on the Magothy and Severn Rivers, at Millersville and Collington, near Bennings, and at the Fort Washington bluff, on the Potomac River.

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* Reports for 1835, '36 and '37.

† First Rept. State Agricul. Chemist of Md, 1860, pp. 76–78.

SECTION OF EOCENE, NEAR THE MOUTH OF ACQUIA CREEK, ON THE SOUTH BANK OF THE POTOMAC RIVER.

Among the fossils recognized from the Maryland Cretaceous are *Terebratula Harlani*, *Ostrea* sp., *Gryphaea vesicularis*, *Exogyra costata*, *Pinna laqueata*, *Cibota rostellata*, *Cucullaea vulgaris*, *Cucullaea tippana*, *Pectunculus Mortoni*, *Trigonia Mortoni*, *Nucula percrassa*, *Perrisonata protexta*, *Crassatella vadosa*, *Crassatella transversa*, *Veniella Conradi*, *Cardium eufaulense*, *Cardium multiradiatum*, *Cardium perelongatum*, *Cyprimeria densata*, *Panopaea decisa*, *Dosinia erecta*, *Tellimera eborea*, *Amauropsis punctata*, *Margaritata abyssima*, *Turritella vertebroides*, *Turritella trilirata*, *Actaeon cretacea*, *Baculites ovatus*, *Ammonites lobatus*.

Many of the forms are highly characteristic for the Upper Cretaceous, but whether the deposits in Maryland represent all or only a portion of the more complete series represented in New Jersey and in the Gulf cannot be definitely determined. The fossils hitherto found seem to indicate the absence of the upper portion of the series as developed in New Jersey.

*The Eocene* (*Pamunkey*). The third of the geological formations found represented in the Coastal Plain of Maryland is the Eocene, which extends along the eastern border of the United States from New Jersey to Texas, although its continuity is broken at several points, on both the Atlantic and Gulf coasts. The area of the Eocene found represented in Maryland is a part of an almost continuous outcrop extending from central Delaware to southern Virginia. On account of the distinctive character of the deposits, both lithologically and paleontologically, they have been called the Pamunkey formation by Darton* from their typical development on the Pamunkey River, in Virginia.

The remarkable green-sands and numerous fossils found in this formation early attracted the attention of geologists. Although the valuable contributions of Finch† and Say‡ in 1824 included references to the Maryland Tertiary, the first really important geological inferences, drawn from a study of the organic remains, were made by Conrad§ in the Journal of the Academy of Natural Sciences of Philadelphia for 1890. Many articles by the same author upon the Maryland Tertiary followed in subsequent years, and to-day the contributions of Conrad remain the most exhaustive that we have upon the Eocene of the State. The more recent articles of Tyson‖, Uhler¶, Darton**, Heilprin†† and the

* Geol. Soc. America Bull., Vol. 2, 1890, p. 439.
† Amer. Jour. Sci., vol. 7, 1824, pp. 31-43.
‡ Philadelphia Acad. Nat. Sci., Jour., vol. 4, 1824, pp. 124-155.
§ Ibid., vol. 6, 1830, pp. 205-217.
‖ First Rept. Agricul. Chemist of Md.
¶ Maryland Acad. Sci. Trans., vol. 1, pp. 11-32, 45-72.
** Geol. Soc. America Bull., vol. 2, 1891, pp. 440-442, 450.
†† Contributions to the Tertiary Geology and Paleontology of the United States, 1884, pp. 10-14.

writer* have added many new facts, but there is much to be done before all the problems presented by the Eocene of Maryland will be fully solved.

The Eocene deposits extend as a nearly unbroken belt from the Delaware line to the Potomac River, and are found in Cecil, Kent, Queen Anne, Anne Arundel, Prince George's and Charles counties. The strike is approximately northeast and southwest; the dip 20 to 30 feet in the mile toward the southeast. The breadth of outcrop upon the eastern shore of the Chesapeake is scarcely five miles at the head of the Sassafras River, but gradually expands toward the southwest until upon the western shore it is in places more than twenty-five miles wide.

The lithological character of the rocks is remarkably persistent. The typical deposit is a green-sand marl, which may, however, by chemical changes, lose its characteristic green color, and by the deposition of a greater or less amount of hydrous iron oxide be found as an incoherent red sand or firm red or brown sandstone. To this is added at times a siliceous cement that produces a firm siliceous sandstone, from which generally most of the carbonate of lime has been removed in solution, so that the organic forms are found only in the shape of casts. The green-sand type is chiefly confined to the southwestern portion of the area in Charles and Prince George's counties, where the deposits overlying the Eocene attain their greatest thickness. In Anne Arundel county and on the eastern shore of the Chesapeake the Eocene is less deeply buried and the strata are more thoroughly weathered, affording greenish gray or red sands, and at times bands of firm sandstone.

The origin of green-sand has long been a subject of great query. The distribution of the green-sand deposits, and the conditions under which they were formed, weree not well understood until the recent publication of the results of the Challenger Expedition upon deep sea deposits.

The accumulation of green-sand upon the present sea floor is found to be limited to exposed coasts and to depths just beyond the action of waves and currents. It never extends to the greatest depths, nor is it found along coasts where the streams carry a large amount of sediment into the sea. Along the higher parts of the continental slope it borders portions of all the continents.

The green-sand is not an original sediment like the deposits hitherto described, but is of secondary formation. The mineral glauconite, the presence of which characterizes the green-sand, is always found in connection with those minerals distinctive of continental rocks and with fragments of the rocks themselves, among which gneiss, micaschist and

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*Johns Hopkins University Circulars No. 65, pp. 65-67; No 81, pp. 69-71; No. 89, pp. 105-108; No. 95, pp. 37-39. U. S. Geol. Survey Bulletin No. 83, 1892, pp. 43-45.

MASSES OF INDURATED EOCENE MARL FILLED WITH THE SHELLS OF TURRITELLA MORTONI

granite are frequent types. Associated with these materials are the shells of Foraminifera and other calcareous organisms. The minute grains of glauconite occur generally as casts of these shells. It is supposed by Murray and Renard* that if "the organic matter enclosed in the shell, and in the mud itself, transforms the iron in the mud into sulphide, which may be oxidized into hydrate, sulphur being at the same time liberated, this sulphur would become oxidized into sulphuric acid, which would decompose the fine clay, setting free colloid silica, alumina being removed in solution; thus we have colloid silica and hydrate oxide of iron in a state suitable for their combination." The potash which is necessary to complete the composition of glauconite is held to be derived from the decomposition of the fragments of crystalline rocks or their common minerals, orthoclase and white mica.

Green-sand has considerable economic importance as a fertilizer, but has never been employed to any extent in Maryland. In New Jersey, on the other hand, the green-sand marls have been extensively used, and the great fertility of much of the farming land in the eastern and southern portions of the State may be directly traced to it.

No widespread division of the series into different horizons is indicated upon lithological grounds, as the variations in composition are apparently due to subsequent chemical changes rather than to original deposition. There are a few local beds of clay and some gravels, but the deposits are chiefly green-sands, either in an unaltered or weathered state. It is likewise impossible with our present imperfect knowledge of the Eocene fauna to attempt to establish definite horizons upon the basis of the fossils, as even the geological range of the best known forms has not been as yet fully determined.

Among the more common species found in the Maryland Eocene are: *Ostrea compressirostra, Cucullæa gigantea, Cucullæa transversa, Pectunculus stamineus, Crassatella alæformis, Crassatella palmula, Crassatella capricranium, Cardita regia, Cardita planicosta, Dosiniopsis Meekii, Cytherea ovata, Pholadomya marylandica, Glycimeris elongata, Pholas petrosa, Monodonta Glandula, Turritella humerosa, Turritella Mortoni.*

Of these *Cucullæa gigantea* is chiefly confined to the basal strata, although in individual cases, as reported by Uhler and Darton, it has been found in the upper portions of the series. *Turritella Mortoni,* on the other hand, is infrequent in the lowest beds, and in the sections on the Potomac and its tributaries is found above those layers in which the *Cucullæa gigantea* is most numerous.

Hitherto few Eocene fossils have been obtained from the deposits of the eastern shore of the Chesapeake. At the head of the creeks tributary

* Challenger Expedition Reports, Deep Sea Deposits, 1892, p. 389.

to the Chester River and on the hills to the north of the latter several characteristic forms are reported by Uhler. Among them *Turritella Mortoni*, *Cardita planicosta*, *Cucullæa transversa*, *Pectunculus stamineus* and *Ostrea compressirostra* have been identified.

On the western shore of the Chesapeake there are numerous localities where typical Eocene fossils are found in great numbers. At South River in Anne Arundel county, and Upper Marlboro, Fort Washington and Piscataway Creek, in Prince George's county, the sections with their fossils have been studied with some care.

The section* afforded by the Fort Washington bluff, so frequently referred to in geological literature, is presented below.

*Section of Fort Washington.*

| | | | |
|---|---|---|---|
| Pleistocene | Coarse gravel | | 8 feet. |
| Eocene | Red sand with casts of *Turritella Mortoni*, *Dosiniopsis Meekii*, *Cytherea ovata*, *Crassatella* sp., *Ostrea* sp. | | 12 feet. |
| Upper Cretaceous | Light, variegated sands, slightly glauconitic | 10 feet. | 20 feet. |
| | Dark, micaceous sand, with *Cyprimeria densata*, *Crassatella vadosa*, *Cucullæa vulgaris*, *etc* | 10 feet. | |
| Lower Cretaceous | Variegated clay, slightly lignitic on upper surface, with layers of ironstone | | 55 feet. |

The Eocene deposits of Maryland may be considered to represent a single horizon until a more detailed examination of the range of the different fossil forms affords us evidence for a division upon that basis.

*The Miocene* (*Chesapeake*). Occupying the region to the southeast of the Eocene, and extending across the State from northeast to southwest, is the Miocene. The great number of organic remains contained in its deposits early attracted the attention of geologists, in whose writings are found minute descriptions of both the strata and their fossils. Many of the latter afforded the original types for Conrad's species. Several of the more important publications upon the Tertiary have already been referred to in the chapter upon the Eocene, and need not be repeated here.

On account of the superb sections of the Miocene found exposed upon both shores of Chesapeake Bay, and along its tributaries, it has been called the Chesapeake formation by Darton†.

The Miocene extends from New Jersey, where it occurs as a thick series of beds which have been penetrated to a depth of many hundred feet in the well borings at Atlantic City, to the southward along the eastern border of the continent. In Virginia it covers much of the eastern portion of the State, and has been penetrated to a depth of 1,000 feet at Fort Monroe.

The deposits of the Miocene lie unconformably upon those of the Eocene, and overlap them along their western border, where they often rest upon the Cretaceous.

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* Johns Hopkins University Circulars, vol. 9, No. 81, 1890, p. 70.

† Geol. Soc. America Bull., vol. 2, 1891, pp. 443-445.

SECTION AT NOMINI BLUFFS, POTOMAC RIVER, SHOWING MIOCENE OVERLAIN BY PLEISTOCENE.

The Miocene consists of sands, clays, marls and diatomaceous beds. The latter, composed chiefly of the shells of microscopic plant forms called diatoms, are in the main confined to the lower portion of the formation, and afford fine sections at Pope's Creek, on the Potomac, at the mouth of Lyon's Creek, a tributary of the Patuxent, and at Herring bay, on the western shore of the Chesapeake. At these points the light colored bluffs are very striking objects in the landscape. The pure diatomaceous earth reaches a thickness of about 30 feet; although the remains of diatoms are found scattered in greater or less numbers throughout much of the overlying strata. The beds of diatomaceous earth at Pope's Creek extend for two or three miles along the face of the bluffs until they finally disappear at water level. The diatomaceous earth can be traced from the Eastern Shore of Maryland across the State to the Potomac River. It is also found extending into Southern Virginia. From its occurrence beneath Richmond it has been called "Richmond earth." It was also referred to for a time in the literature of the subject as "Bermuda earth" from its supposed occurrence on the Island of Bermuda; but the specimens upon which this reference was based were ultimately shown to come from Bermuda Hundred, on the James River. The diatomaceous earth has also been frequently described under the names of "Infusorial earth," "Tripoli" and "Silica." The deposits of diatomaceous earth have considerable economic value, and several companies have been formed to work them at Pope's Creek and on the Patuxent.

The greater portion of the Miocene is composed of sands and clays of various colors, mingled with which are frequently vast numbers of shells of calcareous organisms. Extensive beds of marl thus formed are found outcropping at many points. Sometimes the shelly materials form so large a portion of the deposit as to produce almost pure calcareous layers, which, in a partially comminuted state may become cemented into hard lime-stone ledges. The deposits are at times very carbonaceous and dark in color. Near the mouth of the Patuxent River a bed of lignite several feet in thickness is exposed at water level.

From a study of the miocene deposits and fossils of the western shore of the Chesapeake, Mr. G. D. Harris*, of the U. S. Geological Survey, finds seven clearly defined zones and three distinct faunas, to which he has given the following names, beginning with the oldest: 1, the Plum Point fauna; 2, the Jones' Wharf fauna; 3, the St. Mary's fauna.

1. The Plum Point fauna is characterized by the presence of *Pecten Humphreysi, Area subrostrata, Byssoarca marylandica, Pectunculus parilis, Astarte varians, Astarte exaltata, Crassatella melina, Lucina Foremani, Cardium leptopleura, Corbula elevata, Isocardia Markoei, Venus staminea, Venus latilirata, Pleurotoma marylandica, Pleuro-*

*Amer. Jour. Sci., 3d ser., vol. 45, 1893; pp. 21-31.

*toma bellacrenata, Scala pachypleura, Turritella indenta, Turritella exaltata, Solarium trilineatum.*

2. The Jones' Wharf fauna is characterized by the presence of *Mytiloconcha incurva, Arca elevata, Carditamera producta, Astarte obruta, Crassatella turgidula, Mysia acclinis, Cytherea marylandica, Mya producta, Panopaea americana, Turritella terebriformis, Calliostoma Wagneri.*

3. The St. Mary's fauna is characterized by the presence of *Arca idonea, Astarte perplana, Venus alveata, Mactra ponderosa, Mactra subnasuta, Solen ensiformis, Tebebra simplex, Conus diluvianus, Pleurotoma communis, Fusus parilis, Fusus rusticus, Bulliopsis integra, Nassa peralta, Murex acuticostata, Scala expansa, Turritella variabilis.*

*The Pliocene* (*Lafayette*). Widely covering the deposits of the Coastal Plain hitherto described is a formation composed of gravel, sands and clays, which thus far has afforded no fossils in the State of Maryland to indicate its geologic age. From the fact that the deposits rest unconformably upon the underlying Miocene, and are in turn unconformably overlain by the Pleistocene, they have been considered to represent the Pliocene. Where they are exposed as a superficial covering at the higher levels the strata exhibit much more extensive changes than the Pleistocene, so that much time must have elapsed after the former were laid down before the deposition of the latter. Upon physical grounds then, and not biological, the determination of the Pliocene deposits has been based. To Professor W. J. McGee, of the U. S. Geological Survey, is due the credit of having first introduced this method in the study of the formations of the Atlantic Coastal Plain.

Before the investigations of Professor McGee, the Pliocene, as an independent formation, had not been recognized. The similarity of the coarser sediments especially to the shore deposits of the Lower Cretaceous and the Pleistocene did not, in the absence of fossils, admit of their discrimination until the methods based on the study of the physical and genetic relations of the various beds had been employed.

The similarity of the deposits in Maryland to those described by Professor Hilgard in Mississippi, under the name of the Lafayette formation, led to the adoption of the same name for the strata of the Atlantic coast.

The characteristic features of the formation are found fully described by Professor McGee in the Twelfth Annual Report of the U. S. Geological Survey.

The Pliocene has been more fully investigated in the South Atlantic and Gulf States than in the North, where it is not known to extend with certainty beyond the limits of the Chesapeake area.

Within the State of Maryland the strata cover the higher levels upon the western shore of the Chesapeake, but have not been hitherto described from the eastern counties. Toward the ancient coast line, bordering the Piedmont Plateau, are deposits of coarse gravel, through which is scattered a light colored sandy loam, the whole at times cemented by hydrous iron oxide into a more or less compact conglomerate.

The deposits are very irregularly stratified, and often change rapidly within narrow limits. A typical section is described by Darton * from Good Hope Hill, east of Washington, where "the high terrace is capped for some distance by beds of large pebbles and sand with a buff loam matrix." The eastward extension of the formation shows a lessening of the coarser elements and a larger admixture of loam. As the distance from the coast line increased constantly less and less of the coarser materials could be transported.

Throughout the southern counties the coarser pebbles of the coast are largely replaced by sand. The thickness of the deposits is estimated to reach about 25 feet in Maryland, which becomes considerably increased to the southward.

*The Pleistocene* (*Columbia*). Superficially overlying the other deposits of the Coastal Plain is the Pleistocene, which, with marked variations in thickness, composition and structure, extends from the glacial accumulations of central New Jersey southward through the south Atlantic and Gulf States to the Mexican boundary.

The deposits of the Pleistocene, from their characteristic development in the District of Columbia, have been called the Columbia formation by Professor McGee.† Maryland also presents a typical representation of Pleistocene strata; and three distinct phases have been recognized. They are as follows: The *fluvial phase*, the *inter fluvial phase*, and the *low-level phase*.

The *fluvial phase* is found in its fullest development along the leading waterways and their larger tributaries. It consists of a lower horizon of coarse materials, pebbles and boulders, passing upward into a brownish loam that at times becomes orange yellow in color.

The relative thicknesses of the two divisions varies with their distance from the river channels; the gravels with their pebbles and boulders being most prominent in close proximity to the ancient waterways, while the loams increase in thickness in passing in either direction to a distance from the same. Within the limits of Maryland the fluvial phase is found best developed in proximity to the channels of the Potomac, Patapsco and Susquehanna Rivers, reaching elevations of 150,

* Geol. Soc. America, Bull, vol. 2, 1891; p. 445.

† Report of the Health Officer of the District of Columbia for 1884, '85 and '86; p. 20.

200 and nearly 300 feet in the respective valleys. These deposits are evidence of the depression of the continent, relatively to the sea, to the heights given. That greater elevation is reached by the deposits northward shows greater relative depression in that direction.

Toward the south the fluvial phase becomes much less pronounced, the loam gradually giving place to sand and silt, while the coarser materials form a much less important element in the series.

The loam is much employed in Maryland for brick-making, and numerous industries have been established in the vicinity of Baltimore.

The *inter-fluvial phase* is found typically represented in the country which lies between the waterways, and is characterized by materials of local origin and produced largely by wave action. The small streams on the borders of the plateau country added to the materials of strictly local origin, but as a whole the inter-fluvial phase is far less important than the fluvial. Over much of the region the deposits are of little thickness, and quite disappear in some areas. Frequent gradations into the fluvial phase are to be found toward the leading water ways or at points where the shore currents had transported materials derived from the rivers to a distance from the same.

To the south of Maryland the inter-fluvial phase becomes more and more pronounced, until in the south Atlantic States it greatly surpasses the fluvial phase in extent.

The *low-level phase* is developed throughout the area that is removed from the Pleistocene coast line, and excellent sections of it are found along the shores of the Chesapeake Bay, where it buries to sea-level much of the region in the more southern of the Eastern Shore counties.

The deposits consist of sands, clays and loams, which are often clearly stratified, while their fossils show the distinctly marine conditions surrounding their origin. The fine silts and clays indicate a much slower and much less disturbed type of sedimentation than that found in either the fluvial or interfluvial phase. The deposits must have been scattered as a coating of greater or less thickness over Southern and Eastern Maryland and far beyond its present coastal limits.

Fossils have been found at several localities in the low-level deposits, but the most important locality in Maryland is at Cornfield Harbor, near the southern point of St. Mary's county. Among the many species found the most characteristic are *Ostrea virginica, Mytilus hamatus, Venus mercenaria, Mya arenaria, Pholas costata and Fulgur canaliculatum.*

All the forms are living to-day, some on the neighboring coasts, while others are limited to more distant regions.

SECTION ON ENSOR STREET, BALTIMORE, SHOWING THE LOWER CRETACEOUS OVERLAIN BY PLEISTOCENE.

### RESUMÉ OF MARYLAND'S GEOLOGICAL HISTORY.

Before entirely dismissing the subject of Maryland's geology, it will be worth while to pass briefly in review what have been the probable nature and sequence of events in her long history.

In the earliest days of the earth's existence of which we can take definite cognizance, when as yet the oldest strata which contain evidence of life had not been laid down, the continent of North America was but roughly outlined. There was above the ocean level a great V of crystalline rock, whose apex was at the Adirondack Mountains, in Northern New York, while its two arms stretched, one toward Alaska and the other through Labrador. Upon this great skeleton the continent has since been gradually built up by the accumulation of sediments along its borders. But in these early days there were doubtless other continental areas above the sea, which furnished the source of much of this sedimentary material, but which have themselves more or less completely disappeared. We must draw our knowledge of these old masses from the nature of the rocks composing their scanty remains, and from their relations to the oldest fossil-bearing strata.

When we consider the vast thickness of sediments which accumulated during the whole lapse of Paleozoic time, in the great sea trough of what are now the Appalachian Mountains, we are compelled to assume a great continental or mountain mass lying along the southeastern edge of the continent and extending out into what is now the ocean. What the limits of this mass were toward the east we have no means of knowing, but there is no need of assuming that it reached to the now abyssal depths of the Atlantic. That it must have been lofty, like a great range of mountains, is shown by the rapidity with which it furnished coarse sediments to the inland sea which stretched along its western edge. The great crystalline plateau, which extends from New York to Alabama, along the eastern base of the present mountains, with a breadth of 300 miles in the Carolinas, is its worn-down remnant.

Within Maryland's territory the area which can be referred to this old Pre-Cambrian continent is that which has above been described as the eastern or holocrystalline part of the Piedmont Plateau. Toward the east it has sunk downward, and is now buried beneath the Coastal Plain deposits; toward the west it stretches as the floor to support the Paleozoic strata of the Appalachians, reappearing in the granite and volcanic rocks of the South Mountain.

In the earliest times that we can clearly recognize, these ancient rocks had already been greatly crumpled, altered and metamorphosed by the intrusion of igneous masses, but they furnished a firm floor for the inter-continental sea which then occupied the middle of our country.

At our latitude the oldest shore line was somewhere east of the Frederick Valley, from which westward were spread out the beds of coarse sandstone now forming Sugar Loaf, Catoctin and Blue Mountains. After this the sea rapidly deepened, as is seen by the different kind of sediments deposited (Trenton limestone and Hudson river shales), as well as from the fact that the sea itself stretched much farther toward the east. This latter fact is attested by the isolated troughs of Hudson river shale at Peach Bottom and Quantico, Va., below which little or no Cambrian sandstone occurs.

At the end of the Hudson river epoch occurred the first great mountain-making movement of Paleozoic times. It marked the termination of the lower Silurian period and raised the Green Mountains in New England. Although less pronounced toward the south, its influence was profoundly felt at least as far as Maryland, where it closely folded and metamorphosed the slates and limestones of the western Piedmont region.

After the Green Mountain uplift, the shore-line of the inland sea was pushed considerably westward, and it is doubtful whether it ever again reached a point east of the Blue Ridge, as this barrier was doubtless raised in part, at least, by the Green Mountain disturbance. Through Upper Silurian, Devonian and Carboniferous times comparative quiet reigned. While subject to continual oscillations, the sea floor was in the main sinking, although the high land at its border was so rapidly supplying it with sediment, that the shore-line steadily receded westward.

During the long lapse of Paleozoic time there was also a growth of continental areas in the interior, so that the Appalachian trough was being narrowed from both sides. Finally, near the end of this great time-division, it had become so nearly filled up that large swamps of coal plants flourished, from which the great coal seams of Maryland, Pennsylvania and West Virginia have since been formed. At the close of the coal period occurred the greatest mountain upheaval that eastern America has ever known. The vast trough of sediments, which had accumulated to a depth of nearly eight miles, was folded into a series of wrinkles so gigantic that the former sea was transformed into a lofty mountain chain—at first much higher than it is to-day.

From its first appearance above the waves this mountain range has been continually preyed upon by wind, rain, frost and rivers, until a large proportion of its bulk is now stretched out along our coastal plain. Its growth was doubtless gradual—at least not the product of a sudden revolution—but the end of the coal period may be safely assigned as the time of its maximum elevation, thus forming a fitting close to the first grand division of life's existence on our planet.

By the elevation of the Appalachian trough into the Appalachian mountain range the sea was fairly crowded out of the interior of our continent, at least on its eastern side. Near the close of the first division of Mesozoic time, known as the Triassic age, however, extensive estuaries existed along the eastern edge of the mountains, and in these a great thickness of red sandstone was laid down, cut by and interbedded with flows of a basic lava (diabase). This formation, which we call the Newark, crosses Maryland in a wide, irregular strip through the Frederick valley, and records the earliest deposit which was formed by the washing away of the newly-formed mountains.

At about the close of the Triassic period there was a decided continental elevation which continued throughout Jurassic time. The continent stood along its eastern border so high that the Jurassic strata were doubtless deposited far to the eastward of the coast line of later geological epochs, and are buried to-day beneath the entire series of Coastal Plain sediments. During all this time the land area of central and western Maryland lost greatly as the result of erosion.

With the opening of the Lower Cretaceous there was a marked depression of the continent which brought the sea to and beyond the present eastern border of the Piedmont Plateau. Broad reaches of shallow and brackish water bordered the coasts, and powerful currents distributed the materials brought to the sea by the rivers. At the close of the Lower Cretaceous, the continent emerged and the landward portion of the sediments that had just been deposited were exposed for a time to denudation.

The streams which were now initiated became, at a much more recent date, superimposed upon the underlying crystalline rocks of the Piedmont Plateau. They are strikingly at variance with the structural and lithological characteristics of those rocks, as is shown by the fact that they do not follow the line of the more readily-eroded limestone valleys, but suddenly turn from them across the harder materials. But submergence followed in the Upper Cretaceous, and in quiet marine waters the materials carried from the land were slowly deposited.

At the close of the Cretaceous period the land was again elevated, and the deposits just laid down were cut into by the streams that formed upon the new land surface. But the constant oscillations of the continent continued bringing at the opening of the Eocene another submergence, followed by emergence at its close, while the deposits were laid down over the surface of both lower and upper Cretaceous strata. Twice more in Tertiary time is there submergence in the coastal area, followed by emergence—first during the Neocene, and again in Pliocene time. During the latter period the sea encroached far upon the Piedmont plateau, while the outlines of the present topography were largely carved out. After the

emergence following the Pliocene the continent became again depressed in Pleistocene time, but not to the extent that it had been during the previous period. In the emergence that followed, which carried the land area considerably higher than at present, the continent was more elevated in the north than in the south, as shown by the height of the Pleistocene terraces in the valleys of the Potomac, Patapsco and Susquehanna Rivers. During this period of emergence the channel of the Chesapeake was carved out only to be filled at quite recent date by another submergence.

# CHAPTER IV.

## MINES AND MINERALS.

### DISTRIBUTION AND GENERAL STATISTICS.

Before presenting the particulars in regard to each of the more important of Maryland's industries which depend on the production of mineral substances obtained, either at present or formerly, within the borders of the State, it will be advisable to give briefly the general facts of importance relating to the nature, distribution and production of these substances.

The minerals of any economic value which are known to exist within Maryland's territory, may be divided into three classes:

1st. Those which are now produced with profit, or which are susceptible of future development. In this class may be enumerated—

*Coal.*

*Iron ore.*

*Gold.*

*Building stone:* Granite rocks, marble, sandstone, slate and, possibly, serpentine.

*Decorative stone:* Marble, serpentine and porphyry.

*Limestone,* for burning and flux.

*Hydraulic Cement.*

*Clay:* Brick and potter's clay; fire clay.

*Sand:* Building and molding sand.

*Porcelain materials:* Flint, feldspar, kaolin.

*Soapstone.*

*Mineral water.*

2nd. Mineral products, formerly produced in Maryland, but which are not at the present time actively worked. As such may be mentioned—

*Copper ore.*

*Chrome ore.*

*Ochre,* mineral paint.

*Diatomaceous earth* (infusorial earth; tripoli).

*Magnesium carbonate.*

*Asbestos,* chrysotile.

3d. Minerals known to occur in Maryland, but not in quantities sufficient to warrant their production. To this class belong—

*Lead ore* (galena).

*Zinc ore* (zinc blende).

*Mica.*

*Amber.*

*Plumbago* (graphite, black-lead).

*Manganese.*

*Antimony.*

The distribution of Maryland's mineral resources through the State may be best followed by reference to the geological map. In the crystalline rocks of the Piedmont Region, between the Monocacy and the Chesapeake, we find the most varied, if not the most valuable list. Here occur the most important building stones: the slates of Delta and Ijamsville; the granites of Port Deposit, Woodstock and Guilford; the gneiss of Baltimore; the marble of Cockeysville and Texas; the sandstone of Deer Creek; and the serpentine of Broad Creek and Bare Hills. In these oldest rocks occur also all the ores of gold, copper, chrome, lead and zinc. Much of the best iron ore also belongs here, while all the flint, feldspar, kaolin and mica in the State must be sought for in this horizon.

These older or pre-paleozoic rocks again appear in the centre of the Blue Ridge, where they make the Middletown valley, and here they yield traces of copper, antimony and iron, while some of the red porphyries occurring a little farther north would appear to be well worthy of the attention of architects as decorative stones.

The long sequence of paleozoic strata which stretches from the Frederick valley westward across the State, furnishes much good sandstone and limestone, two horizons of valuable cement rock, and at its top it carries what is now left by man and the eroding agencies of Nature of the wonderful Cumberland Coal basin and its 14-foot vein of solid coal. This same basin contains also deposits of fire-clay and iron.

As we trace the sequence of formations through the more recently formed portions of the State (post-paleozoic strata of the map), we find them not devoid of mineral deposits of economic value. The variegated limestone breccia, known as "Potomac Marble," and the best brown sandstone for building purposes found in Maryland, both belong to the oldest of these post-paleozoic strata—the triassic belt of the Frederick valley and southern Montgomery county. The series of still unconsolidated beds which represents the lapse of time from the lower Cretaceous period to the present, and which composes all of eastern and southern Maryland, besides furnishing valuable lands for various agricultural interests, con-

tains our principal supply of brick, potter's and fire-clay; of sand, marl and diatomaceous earth; and much of our best iron ore.

According to the returns of the Eleventh United States Census, the mineral production of Maryland during 1889 reached a total of $5,157,687. This placed the State twenty-sixth in the list of States of the Union when arranged in order of the relative value of their total mineral products. The census values for Maryland's products during 1889 are arranged as follows:

| | Quantity. | Value. |
|---|---|---|
| Coal (short tons) | 2,939,715 | $2,517,474 |
| Bricks (number) | 1,250,000 | 1,000,000 |
| Granite (cubic feet) | 3,371,032 | 447,489 |
| Cement (barrels) | ca. 200,000 | 180,000 |
| Limestone | | 164,860 |
| Marble (cubic feet) | 333,305 | 139,816 |
| Slate (squares) | ca. 22,000 | 110,008 |
| Iron ore | 29,380 | 68,240 |
| Potter's clay (short tons) | 13,870 | 52,920 |
| Flint (short tons) | 8,632 | 46,828 |
| Sandstone (cubic feet) | 508,325 | 10,605 |
| Ochre (short tons) | 616 | 12,000 |
| Gold (troy ounces) | 501 | 10,369 |
| Mineral water (gallons) | 74,160 | 12,057 |
| Infusorial earth (short tons) | 3,050 | 10,700 |
| Soapstone (short tons) | 432 | 4,321 |
| Unspecified | | 359,300 |

The attempt to compile a correspondingly complete table for the three succeeding years has not been successful. The data obtained are, however, sufficient to show that there has been no very marked change in the total production. Coal has increased, while ochre and infusorial earth have ceased altogether. Mineral water has shown great fluctuations, but almost all the other mineral products have remained about the same. All the details which it has been possible to obtain concerning the various products during 1890, 1891 and 1892, will be given under each of the various mineral industries, which it is now proposed to consider in succession, somewhat from the standpoint of their history and development.

## COAL.*

The coal deposits of Maryland belong to that greatest of all the coal areas of the United States, the Alleghany field. This is 875 miles long and from 30 to 180 broad, covering large portions of Pennsylvania, Ohio, Maryland, West Virginia, Kentucky, Tennessee and Alabama. In the

*See "The Coal Region of America," by Jas. McFarlane, Ph. D., 3d Ed., 1875.

northeastern portion of this area the rocks containing the coal have been thrown into a series of folds which increase in their sharpness toward the east. The increased disturbance has produced a more or less complete loss of volatile portions of the coal, and the production of varieties which are richer in carbon. Three principal types are distinguished. Since most of the coal of the Alleghany field lies in rock strata which have been but little disturbed, it contains a high proportion of volatile gases and less than 70 per cent. of carbon, and is especially valuable for the manufacture of coke and gas. This is called *bituminous coal.* Along the northern and eastern edge of the Alleghany field in Pennsylvania, Maryland and West Virginia, the coal lies in more disturbed strata and contains from 70 to 84 per cent. of carbon. This is known as *semi-bituminous coal,* and is superior to any other for generating steam. In Eastern Pennsylvania, where the coal-bearing strata are much more disturbed, the amount of carbon exceeds 84 per cent., and the coal is of the hard, glistening variety called *anthracite.* This, on account of its cleanliness, is especially fitted for domestic use.

The only area of semi-bituminous coal in the United States is that lying on the northern and eastern sides of the great Alleghany field. The productive area in Maryland belongs entirely to it, and represents its best development. The Blossburg, Towanda and Broadtop regions of Pennsylvania lie in its northern portion, while its southern extension composes the Elk Garden and Upper Potomac basins of West Virginia. The two other coal basins of Maryland mentioned in the geological sketch and shown on the map, are southern prolongations of the great bituminous region of Somerset County, Pa., and have never as yet been economically developed.

The single semi-bituminous coal basin of Maryland is of comparatively small size, but constitutes by far the most important of the State's mineral resources. It is commonly called the Cumberland basin, and sometimes also the Frostburg or George's Creek basin. It is situated in an elevated trough, just west of the city of Cumberland, between two parallel ridges known as Dan's and Savage Mountains. Its length is about twenty miles, and its breadth from summit to summit four and one-half miles. The principal coal bed in the Cumberland basin, known as the "Big" or "14-foot Vein," lies near the top of the series, and has up to the present time been almost exclusively worked. It once probably covered the entire basin, but its extent was greatly reduced by the natural processes of erosion before any mining operations were begun. In a report made to the Consolidated Coal Company in 1869, Prof. James T. Hodge estimated the area covered by the Big Vein when its value was first appreciated, as 17,282 acres, or twenty-seven square miles. From this nearly sixty-six million tons of coal have now been shipped, which,

with the wasteful methods of mining, has reduced the area to about 7,000 acres.

Although almost all of the Cumberland Coal is now obtained from the so-called 14-foot vein, this name is liable to give an erroneous impression of the thickness of coal actually available. At the lower end of the basin it has this thickness, but it thins somewhat toward the north, and there are few mines that can work over ten feet of coal. The upper and lower parts of the seam are more or less mixed with thin layers of slate, which seriously diminish its value close to the walls.

In quality the Maryland coal is unsurpassed. It is a true semi-bituminous coal, with from 72 to 83 per cent. of carbon. This has been proved by numerous experiments to be the coal of maximum efficiency, yielding the highest temperature for a definite quantity of combustible.* The fine portions of the coal cement in burning to a continuous mass, making the "hollow fire" so much desired in blacksmithing. The greatest value of the Cumberland coal is, however, for generating steam, and it is therefore preferred for locomotives, ocean steamers, and in manufacturing establishments. It finds a ready market in New York, Philadelphia, Baltimore and along the entire Atlantic Coast.

The history of the development of the coal industry in Maryland is one of great interest, since, in addition to the wealth it has added to the State, it has also been so instrumental in promoting its commercial and transportation facilities. The Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad, in particular, found in the Cumberland coal fields a strong stimulus to their construction.

Scharf, in his History of Maryland, states that coal was first discovered in the Cumberland basin in 1804. The earliest report on the coal veins of the Cumberland basin was made by the engineers of the Chesapeake and Ohio Canal Company.†

They are also mentioned in Aiken's account of the geology between Baltimore and the Ohio River,‡ and are described by Alexander and Ducatel, in their report to the Governor of Maryland, on the projected survey of the State,§ dated December, 1833.

In his annual reports as State geologist for 1836‖ and 1840,¶ Prof. Julius H. Ducatel describes the Cumberland or Frostburg coal region, and considers the best means of developing it. In 1837 Prof. Philip T. Tyson also published an account of the geological position of the same region.**

*Walter R. Johnson, Report on the Relative Efficiency of Different Coals. Government Printing Office, 1844.

† Collection of Reports and Letters of the Engineers of the C. & O. Canal Company.

‡ American Journal of Science, 1st series, vol. 26, p. 219, 1834.

§ *Ibid.*, vol. 27, p. 28, 1835.

‖ Description of the Frostburg Coalfield An. Rep. for 1836, pp. 48-56.

¶ Mineral Wealth of Allegany County, and considerations on the best means of developing it. An. Rep. for 1840, pp. 21-36.

**Trans. Md. Acad. of Science and Literature, Vol. I, 1837.

Meantime many reports were made by experts to various companies which had secured coal lands in this basin and which were desirous of developing them so soon as transportation facilities were available.

*The George's Creek Coal and Iron Co.* was incorporated April 4, 1836, by J. H. Alexander and P. T. Tyson, and in the same year published an elaborate report containing their charter and a description of their property situated just north of Lonaconing, with maps and sections. A second report appeared in 1839.

Since its first inception this oldest of the Maryland coal companies has maintained its independence and still continues a prosperous existence. Its present president, Mr. J. J. Alexander, is a son of its originator, and assumed office in 1887, exactly half a century after the organization of the company. This company now owns 16,000 acres of land, and has two principal mines, known as the "Dug Hill" and "Pine Hill." It is now developing the coal of the seams below the "big vein." It has a plant of highly improved machinery and a possible output of 2,500 tons per diem. An illustrated account of this company's property and work appeared in the Cumberland *Daily News* of October 7, 1892

Not long after the organization of the George's Creek Company, the *Maryland Mining Company* was started with lands east of Frostburg containing the Eckhart Mines. G. W. Hughes made a report on this property in 1836, and Prof. Benjamin Silliman, of Yale College, another in 1838. This company constructed a railroad from its mines along Braddock's Run to Cumberland in 1846, and was finally merged into the *Cumberland Coal and Iron Company.* This became one of the largest coal companies of the Cumberland basin, and with a capital of $5,000,000, united with the Consolidated Coal Company in 1870.

About 1839, the *Maryland and New York Coal and Iron Company* was chartered, having property near Mt. Savage. This afterward became the *Mt. Savage Iron and Coal Company,* which constructed the first railroad from the Cumberland basin to Cumberland in 1844. In 1864 the *Consolidated Coal Company* was formed by the union of this Mt. Savage Iron Company, the Frostburg Coal Company and what were known as the Aspinwall and Cunard Coal lands. A. J. Center was its first president. Its union in 1870 with the Cumberland Coal and Iron Company, made it the largest coal company in Maryland.

In 1837 the *Boston and New York Coal Company* was chartered, but the coal on their property was found to be in so disturbed and irregular a position that it has never been developed. Between 1836 and 1840, Duff Green organized several companies, the *Union* (1836), *Potomac* and *Allegany* (1839) and *Union Potomac* (1840), which, however, never became important.

The *Franklin Coal Company,* which first shipped coal in 1853, united in 1880 with the *Phœnix Mining and Manufacturing Company* (formerly the Preston Coal and Iron Company, 1855), to form the *Maryland Union Coal Company,* and this was again reorganized in 1890 as the *Franklin Consolidated Coal Company.*

The Black, Sheridan and Wilson Company (incorporated 1891), of Baltimore, now control the *Potomac Coal Company* (chartered 1863), the *Union Mining Company* (formed in 1870, from the Mount Savage Fire-brick and Iron Company (1840) and the Union Mine), and the *Barton and George's Creek Valley Coal Company,* started in 1887.

Beside these important corporations, which have their headquarters at Baltimore, four of the great coal companies of the Cumberland basin have their principal offices in New York. These are the *American, Maryland* and *New Central Coal Company* and the *Borden Mining Company.* The first of these was organized in 1857, with the properties of the original Parker Vein Company and the Jackson Mine. The Maryland Company was formed in 1870 with the property of the old Central Coal Mining and Manufacturing Company. The Borden Mining Company was started in 1848 with the old Clifton Property, near Frostburg; while the New Central Coal Company was organized at a later date.

*The Hampshire and Baltimore Coal Company,* with mines at the south end of the Cumberland basin, and also on the opposite side of the Potomac, was, at one time, a large producer. These mines were practically exhausted in March, 1884, when their shipment ceased.

In his annual report for the year ending December 31, 1891, to the Governor of Maryland, F. J. McMahon, Inspector of Mines for Allegany and Garrett counties, states that the social and economic conditions of the Maryland coal fields are highly satisfactory. He says:

"It is gratifying to be able to say that our region is second to none, and taken as a whole, our miners are as thrifty and intelligent a class of workmen as can be found in any coal region in the world. They earnestly endeavor to comfortably maintain their families and give to their children the benefit of that system of education which the State so liberally provides. It is also a noticeable fact that more literature finds its way into the hands of the miners of this region than in any other coal field in the country, and they are well contented, and perfect harmony exists between them and their employers.

"The shipments of coal from this region for the year ending December 31, 1892, was three million sixty-three thousand nine hundred and nine tons, a decrease of three hundred and fifty-six thousand eight hundred and fifty tons as compared with the corresponding period of 1891. This decrease is said to be due to the desire of our companies to avoid competing with the low prices made early in the year by other companies

outside of this region. It must be remembered that our coal is the highest quality of any shipped to the seaboard, therefore our operators have a standard price on their coal, and it would be doing an injustice not only to themselves, but to their employes if they sold at a figure less than that received at the present time, as they pay their miners at the rate of fifty cents per ton.

"This decrease is also explained by some of our shippers as due to the lack of motive power and cars to ship our coal. Again it is said the cars are detained at the seaboard owing to the scarcity of vessels, and as far as can be ascertained the latter explanation is the more correct one."

The location of all the coal mines now in active operation in Maryland are given in this report as follows:

FROSTBURG REGION—(North end of Cumberland Basin) *Consolidation Coal Company.*

1. Allegany Mine, two miles northeast of Frostburg, on the C. & P. Railroad.
2. Eckhart Mine, east of Frostburg, on the Eckhart Branch C. & P. Railroad.
3. Hoffman Mine, two and a-half miles southeast of Frostburg, on the Eckhart Branch C. & P. Railroad.
4. Old Consolidation Mine, one mile west of Frostburg, operated for local use.
5. New Shaft, two miles south of Frostburg, on the C. & P. Railroad.
6. Ocean Mine, four and a-half miles southwest of Frostburg, on the C. & P. Railroad.

*Borden Mining Company.*

1. Borden Mine, two and a-quarter miles west of Frostburg, on a branch of the C. & P. Railroad.

*Barton and George's Creek Valley Coal Company.*

1. New Mine and Carlos, 3½ miles west of Frostburg on a branch of C. & P. R. R.

*Union Mining Company.*

1. Union Mine, ½ mile northeast of Frostburg, on the C. & P. R. R.

*Big Vein Coal Company.*

1. Big Vein Mine, 2 miles west of Frostburg, on the C. & P. R. R.

*Anthony Coal Company.*

1. Mine ½ mile north of Frostburg, on the C. & P. R. R.

LONACONING REGION. (Middle of Cumberland Basin.)

*Maryland Coal Company.*

1. Appleton Mine, 1½ miles northwest of Lonaconing, on the G. C. & C. R. R.
2. Kingsland Mine, west of Lonaconing.

3. New Detmold and Pattend, 1 mile west of Lonaconing, on the G. C. & C. R. R.

*The George's Creek Coal and Iron Company.*

1. Pine Hill Mine, 2 miles northeast of Lonaconing, on C. & P. R. R.
2. Buck Hill and Cutter Mines, 1½ miles north of Lonaconing, on the C. & P. R. R.
3. Dug Hill Mine, east of Lonaconing, on the C. & P. R. R.

*The New Central Coal Company.*

1. Koontz Mine, 2½ miles north of Lonaconing, on G. C. & C. R. R.

*The American Coal Company.*

1. Jackson Mine, with six openings, one mile south of Lonaconing, on the G. C. & C. R. R.
2. Caledonia Mine, with two openings, west side of Barton.

THE BARTON-PIEDMONT REGION (South end of the Cumberland Basin).

*The Potomac Coal Company.*

1. Potomac Mine, with three openings, one mile east of Barton, on the C. &. R. R.

*The Swanton Mining Company.*

1. Swanton Mine, west side of Barton, on the C. & P. R. R.

*The Franklin Consolidated Coal Company.*

1. Phœnix Mine, two miles west of Barton, on the C. & P. R. R.
2. Franklin Mine, with four openings, one mile north of Westernport.

*The Piedmont and Cumberland Coal Company.*

1. Mine, with two openings, ¼ mile east of Westernport, on the C. & P. R. R.

*G. C. Patterson's Mine,* ¾ mile west of Bloomington, on the B. & O. R. R. works, a four-foot vein.

The total production of the Maryland coal mines during 1892 and its comparison with that of 1891, is given in the following table:

| NAME OF COMPANY OR MINE. | TOTAL, | COMPARED WITH 1891. | | NO. OF MEN EMPLOYED. |
|---|---|---|---|---|
| | | INCREASE. | DECREASE. | |
| | TONS. | TONS. | TONS. | |
| Consolidation Coal Company | 938,695 | 27,718 | ...... | 1,120 |
| American Coal Company | 386,194 | ...... | 67,437 | 390 |
| George's Creek Coal and Iron Company | 300,635 | ...... | 56,292 | 426 |
| Maryland Coal Company | 286,216 | ...... | 120,248 | 401 |
| Borden Mining Company | 255,566 | ...... | 44,702 | 300 |
| Barton and George's Creek Valley Coal Company | 201,989 | 865 | ...... | 279 |
| New Central Coal Company | 201,428 | ...... | 5,385 | 265 |
| Union Mine | 177,304 | ...... | 2,028 | 225 |
| Potomac Coal Company | 140,497 | ...... | 44,209 | 769 |
| Franklin Consolidated Coal Company | 72,578 | ...... | 4,152 | 125 |
| Big Vein Coal Company (Maryland) | 66,984 | 4,152 | ...... | 100 |
| Piedmont-Cumberland Coal Company | 13,498 | ...... | 28,941 | 65 |
| Anthony Mining Company | 11,163 | 1,438 | ...... | 25 |
| Swanton Mining Company | 5,703 | ...... | 27,326 | 50 |

## The Cumberland Coal Trade—From 1842 to 1892 Inclusive—51 Years.

| | Cumberland and Pennsylvania Railroad. | | | | Cumberland C. & I. Co.'s R. R. | | | George's Creek & Cumberland R. R. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | By B. & O. R. R. | By C. & O. Canal. | By Penna. R. R. | Total. | By B. & O. R. R. | By C. & O. Canal. | Total. | By B. & O. R. R. | By Penna. R. R. | Local and B. & O. | Total. |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| 1842 | 757 | ........ | ........ | 757 | 951 | ........ | ........ | ........ | ........ | ........ | ........ |
| 1843 | 3,661 | ........ | ........ | 3,661 | 6,421 | ........ | 6,421 | ........ | ........ | ........ | ........ |
| 1844 | 5,156 | ........ | ........ | 5,156 | 9,734 | ........ | 9,734 | ........ | ........ | ........ | ........ |
| 1845 | 13,738 | ........ | ........ | 13,738 | 10,915 | ........ | 10,915 | ........ | ........ | ........ | ........ |
| 1846 | 11,240 | ........ | ........ | 11,240 | 18,555 | ........ | 18,555 | ........ | ........ | ........ | ........ |
| 1847 | 20,615 | ........ | ........ | 20,615 | 32,325 | ........ | 32,325 | ........ | ........ | ........ | ........ |
| 1848 | 36,571 | ........ | ........ | 36,571 | 43,000 | ........ | 43,000 | ........ | ........ | ........ | ........ |
| 1849 | 63,676 | ........ | ........ | 63,676 | 78,773 | ........ | 78,773 | ........ | ........ | ........ | ........ |
| 1850 | 70,893 | 3,167 | ........ | 76,950 | 119,023 | 875 | 119,898 | ........ | ........ | ........ | ........ |
| 1851 | 128,534 | 51,438 | ........ | 122,331 | 103,808 | 31,540 | 135,348 | ........ | ........ | ........ | ........ |
| 1852 | 150,381 | 46,357 | ........ | 174,881 | 139,925 | 19,362 | 159,287 | ........ | ........ | ........ | ........ |
| 1853 | 148,953 | 84,060 | ........ | 234,441 | 155,268 | 70,535 | 225,813 | ........ | ........ | ........ | ........ |
| 1854 | 93,691 | 63,731 | ........ | 212,684 | 173,586 | 92,114 | 265,694 | ........ | ........ | ........ | ........ |
| 1855 | 86,994 | 77,095 | ........ | 171,056 | 97,710 | 100,691 | 198,401 | ........ | ........ | ........ | ........ |
| 1856 | 80,743 | 80,387 | ........ | 167,381 | 121,945 | 105,149 | 227,094 | ........ | ........ | ........ | ........ |
| 1857 | 48,018 | 55,174 | ........ | 135,917 | 88,573 | 54,000 | 142,573 | ........ | ........ | ........ | ........ |
| 1858 | 48,415 | 166,712 | ........ | 214,730 | 66,009 | 87,539 | 153,548 | ........ | ........ | ........ | ........ |
| 1859 | 70,669 | 211,639 | ........ | 260,054 | 72,423 | 86,203 | 158,926 | ........ | ........ | ........ | ........ |
| 1860 | 23,878 | 232,278 | ........ | 302,947 | 80,500 | 63,600 | 144,100 | ........ | ........ | ........ | ........ |
| 1861 | 23,878 | 68,303 | ........ | 92,181 | 25,983 | 29,269 | 55,279 | ........ | ........ | ........ | ........ |
| 1862 | 71,745 | 75,206 | ........ | 146,951 | 41,096 | 23,478 | 64,574 | ........ | ........ | ........ | ........ |
| 1863 | 117,796 | 173,269 | ........ | 291,065 | 111,087 | 43,522 | 154,610 | ........ | ........ | ........ | ........ |
| 1864 | 287,126 | 104,120 | ........ | 481,246 | 67,676 | 64,522 | 132,198 | ........ | ........ | ........ | ........ |
| 1865 | 384,297 | 285,295 | ........ | 669,592 | 104,651 | 57,907 | 162,558 | ........ | ........ | ........ | ........ |
| 1866 | 592,928 | 291,019 | ........ | 883,957 | 52,251 | 52,150 | 104,419 | ........ | ........ | ........ | ........ |
| 1867 | 623,031 | 385,249 | ........ | 1,008,280 | 40,106 | 72,904 | 113,010 | ........ | ........ | ........ | ........ |
| 1868 | 656,115 | 424,406 | ........ | 1,083,521 | 100,345 | 57,919 | 158,264 | ........ | ........ | ........ | ........ |
| 1869 | 1,019,777 | 573,243 | ........ | 1,590,020 | 130,017 | 78,908 | 208,925 | ........ | ........ | ........ | ........ |
| | | | | | 2,092,657 | 1,192,224 | 3,284,881 | | | | |

| | | | | | Cumberland Branch. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1870 | 909,511 | 520,196 | ........ | 1,439,707 | 114,404 | 83,941 | 198,345 | ........ | ........ | ........ | ........ |
| 1871 | 1,247,279 | 656,085 | ........ | 1,903,364 | 69,864 | 194,254 | 264,118 | ........ | ........ | ........ | ........ |
| 1872 | 1,283,956 | 612,537 | 23,021 | 1,918,514 | 26,566 | 203,666 | 230,152 | ........ | ........ | ........ | ........ |
| 1873 | 1,509,570 | 641,230 | 1,114,589 | 2,265,379 | 88,765 | 137,583 | 227,347 | ........ | ........ | ........ | ........ |
| 1874 | 1,295,804 | 631,882 | 67,671 | 1,994,902 | 113,670 | 135,183 | 248,852 | ........ | ........ | ........ | ........ |
| 1875 | 1,095,840 | 715,673 | 160,213 | 1,971,766 | 52,505 | 164,165 | 216,670 | ........ | ........ | ........ | ........ |
| 1876 | 986,262 | 443,435 | 131,866 | 1,514,563 | 15,385 | 189,005 | 204,390 | ........ | ........ | ........ | ........ |
| 1877 | 755,278 | 478,646 | 170,884 | 1,399,808 | 63,181 | 111,350 | 174,531 | ........ | ........ | ........ | ........ |
| 1878 | 823,801 | 486,038 | 145,864 | 1,455,703 | 99,455 | 123,156 | 222,621 | ........ | ........ | ........ | ........ |
| 1879 | 933,240 | 397,000 | 154,264 | 1,484,513 | 131,907 | 104,238 | 246,145 | ........ | ........ | ........ | ........ |
| 1880 | 1,055,491 | 471,800 | 213,446 | 1,740,737 | 197,525 | 131,325 | 328,850 | ........ | ........ | ........ | ........ |
| 1881 | 1,113,263 | 270,156 | 153,501 | 1,536,910 | 271,570 | 151,526 | 423,096 | 83,136 | 125,097 | 4,947 | 213,180 |
| 1882 | 576,701 | 115,344 | 91,574 | 783,619 | 199,183 | 76,140 | 275,323 | 78,298 | 93,861 | 31,436 | 203,595 |
| 1883 | 851,985 | 302,678 | 217,065 | 1,371,728 | 197,235 | 141,390 | 338,625 | 215,767 | 202,223 | 77,829 | 495,819 |
| 1884 | 1,193,780 | 150,471 | 199,138 | 1,544,389 | 289,884 | 124,718 | 414,602 | 79,765 | 156,959 | 283,436 | 510,070 |
| 1885 | 1,091,904 | 171,460 | 206,227 | 1,469,591 | 289,407 | 117,829 | 407,236 | 79,455 | 214,518 | 291,685 | 585,658 |
| 1886 | 1,131,949 | 115,531 | 141,520 | 1,389,000 | 243,321 | 113,701 | 357,112 | 53,480 | 98,371 | 346,196 | 500,047 |
| 1887 | 1,584,114 | 132,177 | 176,241 | 1,892,532 | 332,798 | 125,395 | 458,103 | 4,863 | 158,230 | 418,057 | 576,150 |
| 1888 | 1,660,406 | 155,216 | 193,046 | 2,008,668 | 374,888 | 95,191 | 470,079 | 112 | 286,787 | 341,024 | 627,923 |
| 1889 | 1,430,381 | 26,885 | 177,153 | 1,634,419 | 368,497 | 26,407 | 394,904 | ........ | 365,039 | 243,487 | 608,516 |
| 1890 | 1,511,419 | ........ | 291,704 | 1,803,122 | 513,334 | ........ | 522,334 | ........ | 677,593 | 228,138 | 905,731 |
| 1891 | 1,628,574 | 9,070 | 289,232 | 1,926,876 | 463,142 | 39,204 | 502,436 | ........ | 763,845 | 229,266 | 993,111 |
| 1892 | 1,426,085 | 92,705 | 214,011 | 1,734,710 | 349,207 | 170,116 | 519,323 | ........ | 568,003 | 236,314 | 804,318 |
| | 31,982,003 | 11,134,363 | 3,581,219 | 46,647,584 | 4,865,613 | 2,759,431 | 7,645,094 | 584,876 | 3,705,516 | 2,733,715 | 7,034,107 |

The development of the Cumberland Coal basin is most closely connected with the extension of transportation facilities from the seaboard at Baltimore and Washington to this region. The National Road was opened between Cumberland and Frostburg about 1836. The Chesapeake and Ohio Canal had been chartered in 1825, and the Baltimore and Ohio Railroad Company in 1827. There was much rivalry between these corporations, as they were to pursue the same routes. The railroad was the first to reach Cumberland, being opened to that place November 5th, 1842, although it did not reach Piedmont until 1851. Coal was at first hauled by wagon from Mt. Savage to Cumberland, but in 1844 the Mt. Savage railroad was constructed along Jennings Run. This road was subsequently extended to Frostburg in 1850, and to Lonaconing in 1857, to connect with the road which the George's Creek Coal and Iron Company had constructed from Westernport (Piedmont) to that place in 1854. This entire line from Westernport to Cumberland came into possession of the Pennsylvania Railroad in 1872, and is now known as the "Cumberland and Pennsylvania." In 1846 the Maryland Mining Company constructed a road from Cumberland to their Eckhart Mines, east of Frostburg, along Braddock's Run. This subsequently became the Cumberland Coal and Iron Company's road, when the Maryland Mining Company was merged into this corporation.

The first shipments of coal were made over the Chesapeake and Ohio Canal, when this was completed to Cumberland, in 1850.

The George's Creek Coal and Iron Company constructed a road from Lonaconing to Cumberland in 1880 along Braddock's Run and begun the shipment of coal by it in 1881.

## THE IRON INDUSTRY.

In reviewing the history of iron manufacture in Maryland we are forced to recognize the fact that we are dealing with an *ancien régime.* The places which once knew the furnaces, forges and rolling-mills in Maryland will probably know them no more. The conditions have so changed that their day of usefulness has passed, and we are on the threshold of a new order of things.

The substitution of steel for the higher grades of iron in many forms, the discovery of extensive deposits of rich ores in other sections of our country, particularly in Michigan, Minnesota and the Southern States, coupled with the wonderful extension and cheapening of transportation, have resulted, within the past few years, in such improvements in the methods of producing iron and steel and in cheapening their cost, as have driven out the charcoal furnace and bloomary, and, under the principal of the survival of the fittest, have left no place for the lean ores of Maryland and the antiquated methods of other days. Present indica-

tions all warrant the belief that we have entered upon an era when extensive plants, operated by aggregated capital, and looking for their supplies to other ore fields than those of Maryland, will take the places of their more numerous and modest predecessors and far outstrip them in the amount and value of their output.

The iron industry of Maryland was developed early in colonial days, and continued, until a recent date, to be an important factor in the prosperity of the State. The history of its growth presents an interesting picture of the gradual unfolding of the mineral resources of the State. The comparatively short period which has elapsed since the cumbersome water-wheel furnace and forge gave place to such furnaces and mills as those of the Maryland Steel Company at Sparrow's Point, and since the old four-horse wagon with its dusky teamster found a substitute in the latest type of modern locomotive, covers the period of the greatest development in material prosperity witnessed by this or any other community.

Beside her many natural advantages of climate, soil, minerals, waterways and forests, Maryland early experienced the benefit of having, among her colonists, many enterprising and industrious folk, drawn largely from the British Isles, who, immediately upon their arrival, turned their attention to the advancement of the natural resources with which they were surrounded. The settlement of the province was made in 1634, and, as early as 1718, we have the record of 3 tons 7 cwt. of bar iron being sent to England, upon which a duty of £6 19s. 1d. was levied. An Act of the General Assembly, passed in 1719, for the encouragement of iron manufacture, sets forth: "That there are very great conveniences for the carrying on of iron works within this Province, which have not hitherto been embraced for want of proper encouragement to some first-class undertakers." In 1840, Alexander, in his report on the manufacture of iron, addressed to the Governor of Maryland, says that Maryland had no iron industry but a bloomary or two until 1724. That iron for commercial purposes was produced to some extent before this date, is evidenced by the passage of an act in 1681, imposing a duty on the export of iron. In 1648, mention is made of the fact that pig iron was then worth £12 per ton, and that the facility with which iron could be mined, and the cheapness with which fuel could be obtained on the numerous watercourses, enabled those engaged in its manufacture to earn high wages. This fact doubtless attracted many to the shores of the Patapsco, stimulated, speculation in lands and exercised some influence upon the location of the future City of Baltimore. Beds of carbonate and oxide ores extend from the vicinity of Washington, in a north-easterly direction across the State, being found in the counties of Prince George, Howard, Baltimore, Harford and Cecil; and it was within this ore belt

that the furnaces and forges of colonial days were located. These lean ores, noted for the purity of the iron they produced, have, until a recent date, been extensively used in the manufacture of high grade charcoal pig iron, employed in making car wheels and malleable castings. Johnson, in his history of Cecil county, says: "The first iron works in Maryland were probably erected in Cecil county, at the head of the Chesapeake Bay. In a deed dated 1716, in which Robert Dutton conveys lands on the Main Falls, the North East Iron Works are mentioned among the appurtenances." Swank, in his history of the "Manufacture of Iron in all Ages," gives much valuable and accurate information concerning the early iron works of Maryland, and especially of the Principio Company. This treatise has been largely used in the preparation of this section.

About the time of the passage of the Act of 1719, before alluded to, Joseph Farmer, an ironmaster of England, came to Maryland on behalf of himself and others, and in 1722 organized the Principio Company and commenced the erection of a furnace in Cecil County, near the mouth of Principio Creek, which empties into the Chesapeake Bay, six miles from the town of North East. Alexander says that a part of the hearth of this old furnace was still standing in 1840. This company was composed of English gentlemen of wealth, and familiar with iron manufacture in the old country. At an early date in the history of this enterprise, probably in 1725, Augustine and Lawrence Washington, of Virginia, the father and half brother of the future President of the United States, became interested in this company. This concern soon outranked all others in America in the manufacture of pig and bar iron, being the proprietor of three furnaces and two forges in Maryland, and of the Accokeek furnace in Virginia. The original works built at Principio and at North East, in Cecil County, on the line of the Philadelphia, Wilmington and Baltimore Railroad, are still producing iron, after having passed through many vicissitudes and into the hands of many owners. The old stone stack has given way to a first-class modern furnace, complete in all its appointments, and the old forge, to a rolling mill containing all the effective and labor-saving appliances of modern skill. Beside these two properties, the Principio Company built the Kingsbury Furnace in 1744, on Herring Run, at the head of Back River, and in 1751, purchased from Doctor Charles Carroll, of Annapolis, the Lancashire furnace, located near the Kingsbury, both in Baltimore County. In 1761, the Governor and Council of Maryland reported to the Commissioners of the Board of Trade and Plantations in England, that there were eighteen furnaces and ten forges in that State, which made 2,500 tons of pig iron per year.

On the breaking out of the Revolutionary War in 1776, the Principio Company had no actual control over any of its American property,

although Thomas Russell operated the furnaces and forges and supplied bar iron and cannon balls to the Continental Army. In 1780, the General Assembly of Maryland passed an act to seize and confiscate all British property within the State, and all the property of the Principio Company, with two exceptions, was sold. The works at North East were retained by Thomas Russell, who had cast in his fortune with the patriotic cause, and for a like cause the interest of the Washingtons could not be confiscated. At this time one of the Washingtons, probably the son of George Washington's half-brother Augustine, owned a one-twelfth interest in the Principio Company.

The Principio Furnace was purchased by Samuel Hughes and others, who, during the war of 1812, manufactured cannon, cannon-balls and hardware. Guns as large as thirty-two pounders were made for the government, some of them hauled as far as Pittsburgh by teams. An expedition from Cockburn's fleet, toward the close of the war, destroyed these works and spiked and otherwise rendered the guns on hand unfit for service. About forty years ago a whole pig of iron was found near the site of the first Principio furnace, plainly stamped "Principio, 1727." Over twenty years ago several pigs of iron stamped "Principio, 1750," were discovered in the bed of the Patapsco River. Mr. Henry Whiteley not long since published a very interesting historical essay on the Principio Company. Mr. John English, who died in 1734, came out from England in the interest of this company as its manager. He built the first furnace and forge in Maryland, and was one of the most intelligent, enterprising and successful of American iron manufacturers. His correspondence with the home company is still in existence, preserved by the Maryland Historical Society. In 1836 the Principio Furnace was sold under foreclosure to its present owners, the Messrs. Whittaker, and the forge at North East, after many changes and transfers, became the property of the present McCullough Iron Company.

Thomas Russell, a grandson of the original person of that name interested in the Principio Company, built a furnace in 1802 at North East, which was in operation only a few years.

The Baltimore Company, which was incorporated in 1723, built a furnace at the mouth of Gwynn's Falls the same year, on lands belonging to John Moale. This was the second blast furnace built in Maryland. In 1765 a one-fifth interest in this property was sold for $5,200. Bishop says that during the revolutionary war there were seventeen or eighteen forges in operation in Maryland, in addition to furnaces and other iron works, showing to what extent the development had taken place in colonial days. These furnaces and forges were built mostly on tributaries of the Chesapeake Bay. They were all of the same type, using

charcoal for fuel with cold blast and applying the power to the blow cylinders by waterwheels.

The life of an ironmaster in these early days, when the conveniences of travel were few and local events claimed a much greater share of attention than at present, when the newspaper was rarely seen, if seen at all, and daily life in the country was limited to the immediate surroundings, was not entirely devoid of interest and of a certain charm. The vicinity of the furnace or forge (they were generally located together), was always the scene of activity and bustle, the store and post-office were generally an appendage of the iron works and the rendezvous of all the gossips and politicians of the neighborhood.

The Bush Furnace, in Harford county, was built about 1760. It was owned in 1776 by John Lee Webster and operated in 1850 by Richard Green, who died in 1861, when Wm. F. Pannell became the owner and changed the name to the Harford Furnace. Pannell carried on business successfully until 1870, when he sold the property to Clement Dietrich of Cincinnati, who added a large factory for the manufacture of pyroligneous acid. Dietrich's operations were very disastrous, involving the loss of several hundred thousand dollars. The property has since gone to ruin. The ores were obtained from the neighborhood or brought from Baltimore county.

In 1769 Zaccheus Onion operated a furnace and forge built by his grandfather, about one mile from the town of Joppa, then one of the most important places in Maryland; and in 1762 Robert Evans and others built the Unicorn Forge, in Queen Anne's county, near the town of Maysbury.

In 1768 the Hockly Forge, on the Patapsco, was owned by Robert Croxall, and in 1774 was operated by the Baltimore Company, with Wm. Hammond as manager.

The remains of a furnace, forge and puddling mill built in colonial days is still to be seen on the Mt. Peru estate, near Jericho, on the Little Gunpowder Falls. Whittaker's Furnace, near the Gunpowder, was built in 1810, and used as a shovel factory. It was subsequently purchased by Horace Abbott, who converted it into a forge for making shafts for steamboats.

In early days John Ridgely built two furnaces, one known as the Nottingham, on White Marsh Run, which was permanently out of blast in 1815. The second, on the Great Gunpowder, produced small cannon and swivel in 1776. This property was purchased by the City of Baltimore for the Gunpowder water supply. Ridgely also built a furnace north of Towson, near the Pott Spring estate, which was in operation until about 1850.

The Joppa Iron Works, built by J. W. & E. B. Patterson, were in their day one of the most extensive in Maryland. Situated at the head of the Big Gunpowder, they were in successful operation up to the time of the civil war. They consisted of a large rolling mill, nail factory and a forge, and produced large quantities of bar iron and nails, enjoying a great reputation in the market. The ruins of these works are still standing.

In 1800 the Dorseys built the Avalon Works on the Falls of the Patapsco. These extensive works were operated by Evan T. Ellicott & Company for a number of years, and sold in 1850 to John McCrone & Co., who afterwards sold them to J. H. Hand. In 1848 rails were made for the Baltimore and Ohio Railroad Company at these works. The mills produced all descriptions of merchant iron—sheets, hoops and nails. The Ellicotts had a large warehouse at the corner of Light and Balderston streets, where the product of these works was stored and sold. They were operated with varying success until July, 1868, when a cloudburst caused a most disastrous flood in the Patapsco valley, sweeping away mills and dams, with great loss of life and property. The Avalon Works, which had just been remodeled and provided with new machinery, were in full operation. The operatives barely escaped with their lives. The works were never rebuilt.

Edward Dorsey owned a furnace and forge at Elk Ridge Landing on the Patapsco. In 1835 Messrs. Ellicott & Bro. made cast iron water pipe at this furnace for the Croton Water Works of New York. The furnace was rebuilt in 1855, but has been out of blast since 1874.

Early in the present century Thomas and Richard Snowden owned the Patuxent Furnace and Forge in Prince George's county. They sold the property to Evan T. Ellicott & Company, who built an additional furnace and rolling mill for making muck bars for the Avalon Works. These works were last operated by Messrs. Lemmon & Glenn, and have long since been abandoned.

In 1802 Thomas Russell and Daniel Sheredine built a furnace at North East, which only remained in blast until 1806. The Marley Furnace, built by William Goodwin and Edward Dorsey on an arm of Curtis Bay, mentioned in 1781 as the Curtis Creek Furnace, was in operation as late as 1851, when it was finally abandoned. Its picturesque remains are still to be seen.

In 1810 a rolling mill was built on the Big Elk, Cecil county, about five miles north of Elkton. It was operated for several years by Parke Brothers, producing boiler plate iron from blooms and muck bars. The firm of Parke, Smith & Company succeeded to the business in 1858 and altered the mill into a sheet mill. The concern was driven out of the business by the active competition of mills more favorably located.

In Frederick County were several early enterprises, the particulars of which have been presented by Alexander. Old Hampton Furnace on Thorn's Creek, two miles west of Emmittsburg, was built in 1770. Legh Furnace, at the head of Little Pipe Creek in Carroll County, near Westminster, was built about the same time; both were soon abandoned.

In 1774 James Johnson & Company built the Catoctin Furnace in Frederick County, and produced pig iron from neighboring ores and charcoal. It was rebuilt in 1787 nearer the ore banks on Hunting Creek. These works furnished guns and projectiles to the Continental Army. These same parties built the Bush Creek Forge with a rolling and slitting mill; abandoned in 1810.

In 1793 Thomas and Baker Johnson became the owners of Catoctin Furnace, and Baker Johnson sole owner in 1803. From 1811 to 1822, this property was operated by Willoughby and Thomas Mayberry, when it was sold to John McPherson Brien and John McPherson, who in 1843 sold to Peregrine Fitzhugh. This latter owner, under different co-partnerships, manufactured iron until 1857, when becoming embarrassed, the property fell into the hands of John Kunkle, who willed it to his sons John B. and Jacob M. Kunkle, and in 1866, John B. became sole owner. During the decade 1860 to 1870, covering the period of the civil war, these works enjoyed a period of great prosperity, and large additions were made to the landed estate. The ore banks were extensively opened, and in 1882 an anthracite stack was built, 12x44 feet, 6,000 tons capacity. The ores used were brown hematite and magnetite. Financial disaster, which seems to have pursued this concern for over a century, again overtook it, and at Colonel Kunkle's death in 1885, his estate being heavily embarrassed, this property was sold to meet the demands of his creditors. His heirs formed a joint stock company and operated the furnace for a short time, but meeting with no success, sold the works to the present owners, "The Catoctin Iron Company, of Frederick County." For reasons stated hereafter, it is doubtful if the manufacture of iron will ever be resumed at Catoctin, although it is possible the extensive ore banks may be worked to supply furnaces more favorably located.

In 1787 the Johnson Furnace was built on a small stream a mile above the mouth of the Monocacy, and in 1783 Roger Johnson built a forge on Big Bennett's Creek, which he called Bloomsbury, which was abandoned in 1880.

The Fulderia Furnace, about three miles south of Frederick, built soon after the Revolution, made only one blast.

Alexander mentions a number of iron works in early days in Washington County. The earliest and most successful was the Mount Etna Furnace, on a branch of the Antietam near Hagerstown, built by Samuel

and Daniel Hughes, in 1770. This concern was in successful operation for many years, and cast the first Maryland cannon during the war of the revolution. The same parties built a forge about a mile and a-half below the furnace.

In 1775 Henderson & Ross built a furnace at the mouth of the Antietam. It was rebuilt and operated in 1845 by McPherson & Brien, producing pig-iron and blooms. After the civil war P. A. Ahl & Bro. restored the furnace and produced pig-iron from coke for a few years, but it is now abandoned.

In 1770 James Johnson built the Green Spring Furnace and also a forge near Licking Creek.

The development of iron ores belonging to the coal measures of Western Maryland was undertaken over sixty years ago. In 1828 a furnace and forges were built on Bear Creek and abandoned in 1834. In 1837 a furnace was built at Lonaconing for the George's Creek Coal and Iron Company, using coke. Owens says that this was at the time the most successful coke furnace in the United States. About the same time the Wellburgh Furnace was built, but was never a financial success.

In 1840 two large furnaces were built by the Mt. Savage Iron Company nine miles northwest of Cumberland. The Mt. Savage Rolling Mill, built in 1843, rolled the first heavy rail made in the United States. This was of the inverted U pattern, and the Vulcan Furnace, eight miles below Cumberland, had a short and unsuccessful career. In 1846 the Lena Furnace was built at Cumberland, first using coke, and afterwards charcoal. The Bowery Furnace, built at Frostburg by the Cumberland Coal and Iron Company, in 1868, was rebuilt in 1873, and remained in blast several years; it has since been abandoned.

The Lonaconing Furnace, built at Knoxville in 1837, went finally out of blast in 1874.

The Canton Forge, located at Canton, was operated by Peter Cooper in 1828-1829. He sold the property in 1836 to Horace Abbott, who carried on business there for some years with a partner named Lawrence, making a great reputation for heavy forgings for steamboat work and large machinery. In 1851 Mr. Abbott commenced the manufacture of plates in a modest way, gradually extending and enlarging his works, till in 1856, they consisted of two large plate mills capable of making a large output of boiler and plate iron. His son-in-law, Mr. John S. Gilman, joined him, and under the firm name of H. Abbott & Son, they did a prosperous business. In 1859 the third large plate mill was erected, which, after the breaking out of the war in 1861, was utilized almost exclusively in the manufacture of armor-plates for government vessels. The armor of the Ericsson monitor was made at these works. The business was carried on till 1865, when H. Abbott &

Son sold the property to an association of capitalists, who were incorporated under the title of "The Abbott Iron Company," with Mr. Horace Abbott as President, and John S. Gilman, Treasurer, with a capital of $500,000. In 1865 a rail mill was erected and the company's business greatly enlarged. After some years the gradual substitution of steel and iron having made serious inroads on the business of the company, as it was not prepared to manufacture steel, and the price of steel rails having declined as low as the cost of making muck bars, the company closed their business in 1878-'9.

Andrew Ellicott built, in 1842, a furnace and muck bar mill on Locust Point, which were abandoned in 1850. The first successful hot blast stove erected in the United States was built here. Edward Grubb, father of the late Minister to Spain, went to England and, in order to get an opportunity to inspect the stove then in use, donned a working man's clothes and hired as a filler. In this way he succeeded in obtaining plans, and upon his return to America had the castings made at York, Pa., intending to erect the ovens at the Codorus Furnace; but Mr. Ellicott purchased the castings, and, sending his manager with six mule teams to York, hauled the castings to Locust Point. This furnace made a good quality of cast steel in brick ovens—the first made in Maryland.

J. H. & B. H. Ellicott carried on in Baltimore the City Block Bar Mill near the draw-bridge, from 1840 to 1855, and Trego, Thompson & Company started a forge, at the foot of Caroline street, in 1853. In 1856 this was enlarged into a steam forge and rolling mill, with a capacity of about 75 tons of finished iron per week. They also made hammered railroad axles and steamboat shafting. They suspended operations in 1876.

In 1843 Peter Morrell and Mr. Numsen built the first Cedar Point furnace at Canton; number two was built in 1846. These were charcoal furnaces, 8 feet bosh by 30 feet high. They were sold in 1863 to Horace L. Brooke, who subsequently sold the property to the Philadelphia, Wilmington and Baltimore Railroad Company for coal docks.

The Muirkirk Furnace, named after a furnace in Scotland, was built in 1847 by the Ellicotts. It was the first charcoal furnace in the country to use a hot blast in the top of the stack, and to take the gas to make steam. In 1855 W. C. Coffin & Company, of Boston, leased it to George Cary, of Baltimore, but in 1860 operated it themselves. In 1863 it came into the possession of its present owner, Mr. Charles E. Coffin. It is still in operation, the only survivor of the rural charcoal furnaces in the State. The iron has been principally used by the Government, it being guaranteed to stand 30,000 pounds to the square inch in the pig, many tests giving 40,000 pounds. The ore is obtained from the neighborhood, the flux used being oyster shells obtained in Baltimore. The excellent

quality of the iron accounts for the furnace being still in operation, successfully competing with the cheap charcoal irons of the west and south.

The first Ashland furnace, near Cockeysville, in Baltimore County, was built in 1837 by Christopher Geiger, who afterwards disposed of it to Philip A. and Samuel Small, of York, Pa., and Joseph W. and Edward Patterson, of Baltimore, who operated it under the firm name of Patterson, Small & Co. The second stack was erected in 1848. The fuel used was anthracite coal and hematite ores. The ores were largely from the Oregon Ore Bank, three miles distant. Oregon Furnace was built in 1849 by Richard Green, of Harford County, Md., at Oregon, contiguous to the ore bank leased by him from Miss Charlotte C. D. Owings, which adjoined that held by Patterson, Small & Co. This was the chief ore used at this point for the manufacture of pig iron. The fuel was anthracite coal, which was hauled from Cockeysville, Md. Difficulty having arisen between Patterson, Small & Co. and Mr. Green, in reference to priority and right of ore leases under Miss Owings, which culminated in armed resistance as well as in expensive litigation, a consolidation of interest was agreed upon, and the Ashland Iron Company incorporated, Mr. Green being appointed manager, and remained such until his death in 1861. Oregon furnace was run but a few years, as pig iron could be made more economically at Ashland. This iron was made mostly from hematite ores obtained from Oregon and Timonium, in Baltimore county; from Green Spring Valley; from Hanover, Pa., etc., and magnetic ore, from near Whitehall, was also used. The weekly product was from 150 to 200 tons of foundry and forge pig iron of excellent quality. The fuel used was anthracite coal. Limestone was obtained from their quarry in York, Pa., and from Texas, in Baltimore county. A third furnace was erected at Ashland in 1864.

The Elba charcoal furnace near Sykesville, Carroll county, built in 1848 by Griffiths, Cate & Belknap, was bought by Isaac Tyson, Jr., in 1849. The ore was mainly supplied from a fissure vein extending as far as Finksburg, on the Western Maryland Railroad, and was mixed with ores from the neighborhood of Baltimore, and with hematite from near Mount Airy. The iron was used principally for car wheels. The furnace was blown out in 1868, just before the great flood of that year, which wrecked the property. At one time anthracite was used in connection with charcoal, without serious detriment to the quality of the iron.

The Locust Point Rolling Mill, Messrs. Coates & Brother, built in 1862 with a capacity of 5,000 tons, is now manufacturing tin plates.

The Baltimore and Ohio Railroad Company built in 1870 at Cumberland a rail mill with fifteen double puddling furnaces and fifteen heating

furnaces, three trains of rolls, three hammers, and in 1873 a bar mill for making bar iron, bolts, rivets, spikes and fish plates. The capacity of the two mills was 40,000 tons. The manufacture of rails was abandoned in 1882. Since then the mill has been leased to the Cambria Iron Company, who now use it for rolling steel billets.

The Cumberland Steel works were built in 1873, with four steel hammers and twenty-four crucibles. These works are no longer in operation.

The Canton Iron Works, built by Anderson Brothers & Company, at Canton in 1878, manufactured bar iron. They were abandoned in 1883.

Other less important ventures were the Naseongo Furnace, built by Mark Richards in 1830, near Snow Hill, Wicomico county, and only operated a short time during the war; a rolling mill, erected by Samuel T. Ellicott, just above Ellicott City in 1830, but dismantled in 1840; the Locust Grove Furnace on Stemmer's Run, built in early days and operated until 1869; the Savage Furnace, near Laurel, abandoned in 1874 and now in ruins; the Laurel Furnace, built at Locust Point in 1846, and the La Grange Furnace and Bloomary, built in 1836, are now abandoned. The latter was in operation until 1874.

The only furnaces now manufacturing Maryland iron are Muirkirk and the Stickney Iron Company, at Canton. The McCullogh Iron Company continues to operate two old rolling mills, the Octorora, at Rollandsville near Port Deposit, built in 1829, and the mill at North East, built in 1847 and rebuilt in 1875. Their third mill, the West Amweil Works at Elkton, is now abandoned.

It is doubtful whether any of these can long continue to compete with the great iron and steel plants using foreign ores, or those from distant parts of this country.

A new regime has entered in by the inauguration of the great works at Sparrow's Point, built by the Maryland Steel Company, destined in the future not only to be great producers of iron and steel, but to add another to Maryland's industries which will be of equal if not paramount importance—the construction of iron vessels. Although a half decade has scarcely passed, these works have assumed great proportions.

The property owned by the Maryland Steel Company, consisting of about one thousand acres, was purchased by the Pennsylvania Steel Company early in 1887. Preliminary surveys were at once made, and a plant for the manufacture of red bricks to be used in the construction of the works was established in July of the same year.

The foundations of the blast-furnace plant were commenced in August of that year, and the first furnace was completed and blown in in October, 1889. Three others have since been completed. The furnaces are each eighty-five feet high, twenty-two feet in diameter at the bosh

and have a daily capacity of from 225 to 300 tons when working on the usual mixtures of foreign ores.

The Baltimore and Sparrow's Point Railroad, connecting these works with the Pennsylvania and the Baltimore and Ohio Railroads, was commenced in March, 1888, and opened for passenger and freight traffic in January, 1889.

The construction of the Bessemer plant and rolling mill was commenced in May, 1889. The first heat of Bessemer steel, and the first Bessemer steel ever made in Maryland, was made at 4.17 P. M., August 1st, 1891, and the first rail was rolled six days later. The capacity of the Bessemer Department as it now stands, is from 1,800 to 2,000 tons per day, and the rolling mills about 1,500 tons per day.

The construction of the foundry, machinery, boiler and pattern shops was carried on contemporaneously with the rolling mills.

The construction of the buildings and slips of the Marine Department was begun in March, 1890. The first boat, the tug *Pennwood*, 107 feet long by 21 feet beam, was launched at 1 P. M., May 30th, 1891. Since that time there have been completed five other boats: The *Douglas H. Thomas*, 122 feet 9 inches long by 21 feet beam; the *Lancaster*, 213 feet long by 32 feet beam: the *Alabama*, 305 feet long, 43 feet beam; the *Germania*, 80 feet 6 inches long, 17 feet beam; the *Frances*, 85 feet 6 inches long, 17 feet beam.

Three other boats are now in course of construction—a steamer 293 feet long, 42 feet beam; and two tug-boats, one of which is 85 feet 6 inches long by 17 feet beam, and the other 111 feet 7 inches long by 22 feet beam.

Additional shops and apparatus are being constantly added to this department, which is now one of the most complete in the world.

The steel plates, shapes and castings used in the construction of vessels at this shipyard are at the present time manufactured by the Pennsylvania Steel Company at Steelton, Pa. It is, however, the ultimate intention of this company to manufacture all this material at its own plant.

The pig iron is smelted chiefly from Cuban ores from the Jurugua mines, which are controlled by the Pennsylvania Steel Company and Bethlehem Iron Company. These are mixed to a greater or less extent with ores from Spain and Algeria.

The coke used in the blast furnaces is obtained partly from the Connellsville region, partly from the Mountain region about Galitzin, Pa., and partly from West Virginia.

Bituminous coal is brought from Pennsylvania and West Virginia, and the limestone used in smelting from Texas, Baltimore County.

Fourteen hundred men are employed in the steel works and machine shops, which number would be increased to seventeen hundred if the plant were in full operation. Seven hundred men are employed in the marine department.

### COPPER.

There are in Maryland three veins of copper ore, which, before the opening of the Lake Superior copper region, about 1844, and later of the Montana and Arizona mines, were considered of no mean promise, and did actually make Maryland for a time one of the copper-producing States. The first of these veins runs along the Linganore hills, in Frederick county, from New London northward to a point beyond Libertytown. On this vein are the New London mine, near the town of that name, containing rich purple ore in seams and pockets through a slate vein; the Dollyhide Mine, containing purple ore in considerable quantities between the slate and limestone, and the Liberty mine of rich gray ore in seams and bunches through limestone, these two latter mines being near the town of Liberty. About 20 miles east of these are three other mines on a distinctly marked vein running northeasterly from near Sykesville, on the Baltimore & Ohio Railroad, through Carroll county, to and beyond Finksburg, on the Western Maryland Railroad. These are the Springfield mine, on the Patterson estate, near Sykesville, the Mineral Hill mine, about five miles northeast of it, and the Patapsco mine, near Finksburg, about five miles further to the northeast. These mines are all in a slate formation, and formerly produced sulphurets of high grade.

The third deposit is in the Bare Hills, near Mount Washington, on the Northern Central Railroad, where the Bare Hill mine is located in the hornblende gneiss, producing a good sulphuret ore. There were also small quantities of ore taken from various prospect holes and outcroppings, but these are the only mines that were ever worked as such. They are now all closed down and, with the exception of the Mineral Hill and the Bare Hill, apparently forever. These two, while not running now, have considerable promise of ore; but the low price of copper, the smallness of the deposits and the cost of equipping them with modern machinery, has for some years prevented them from being worked.

That Maryland was early explored for mineral wealth is shown by a report on the Province, made in December, 1748, by the Governor and Council to the London Board of Trade, which, among other items, states that "there are in the Province great shews of copper in many places, but of the several attempts that have been made to discover veins of that metal none has yet been made that quitted cost."

It must have been shortly after this that a party of English miners opened the Liberty and Mineral Hill mines. They built a small smelting

furnace on the Deer Park tract of land near the latter mine, where they smelted the ores from both mines, and must have produced considerable quantities of copper, as was shown by the large amount of rich slags and residues left at the furnace, which, nearly a century later, were hauled to Baltimore and profitably reworked. At the breaking out of the Revolutionary war these Englishmen went to England, intending, tradition says, to return as soon as "the insurrection was suppressed." From this time little regular mining was done until 1835, when Isaac Tyson, Jr., leased and opened the New London mine, which he worked from time to time until he sold it in 1855, shortly after which it was abandoned. About 1838 he reopened the old Liberty mine and erected a small furnace near by in which the ores were smelted. In 1845 he obtained control of the neighboring Dollyhide mine (so called, it is said, from an Indian name), which had previously been spasmodically worked on a small scale, and ran this mine until 1855, when he sold it to the Dollyhide Mining Company. This company was shortly afterwards drowned out while sinking a shaft near a swamp, and the mine abandoned, the machinery being sold and removed to the Springfield mine. This Springfield mine was also opened by Mr. Tyson in 1849, primarily for iron ore, but it developed into a copper mine, and for many years produced freely and profitably. The Springfield Copper Company was organized, the machinery from the Dollyhide mine set up, and until 1869 the mine was quite prominent as a producer of copper and as a popular local speculative mining stock. It was sunk to a depth of 1,400 feet on an incline, and was still producing at the time the original twenty-one year lease expired. A renewal of the lease could not be arranged with the owners of the property, and the mine was then robbed of its pillars and caved in beyond recovery.

In 1849 Mr. Tyson re-opened the Mineral Hill mine, his attention having been attracted to it by the rich slags from the pre-revolutionary furnace near by, and worked it successfully until 1861, and then transferred it to the Mineral Hill Mining Company, which company his heirs still control. This mine was worked almost continuously until two or three years ago, and even now has not been abandoned, but only temporarily closed. The Liberty mine, after being worked by Mr. Tyson until 1864, was transferred to the Liberty Mining Company and purchased by New York parties, who bonded the property and spent large sums of money upon it. Owing to difficulties among the owners, it was sold out under a mortgage in 1876, the new owners organizing the Maryland Copper Mining Company, which worked the mine until 1885. It was then abandoned.

The Patapsco mine, near Finksburg, was opened by E. Remington and some Philadelphia parties in 1849, under the name of the Patapsco Mining Company. Shortly afterwards they discovered traces of cobalt

and nickel, and reorganized their company, with an increased capital, as the Patapsco Copper and Cobalt Mining Company. They built furnaces for the treatment of the ores, but in 1858 closed down without ever starting them, having lost much money in their operations. In 1860 the mine was bought by Baltimore parties, who organized the Maryland Copper Company, and ran the mine vigorously until 1865, when it was abandoned.

The only other copper mine is the Bare Hill, or Vernon mine. It was opened by Thomas Petherick about 1845, but soon abandoned by him and taken up by a Mr. Davis, who sold it to Isaac Tyson, Jr. Petherick had taken it from the owners under a Cornish lease for twenty-one years, the lease being the same that has been used for centuries in England. When Davis's lease expired, Mr. Tyson endeavored to hold the property under this Cornish lease, which he had bought from Petherick, but after a long and hard-fought lawsuit, the decision was rendered that this form of lease was not binding, owing to technical points in its construction, and the property went back to the original owners. It is said that this decision caused great anxiety in Cornwall, where so many valuable mines were being worked under leases of this kind. After passing through several hands, the property came into the control of the Bare Hill Mining Company, and later into the hands of the Vernon Mining Company, and is now owned by Baltimore parties, who have strong hopes that the mine will again be worked. This mine has produced considerable quantities of ore, and has, it is asserted, made money for its owners at times when copper commanded better prices. It has been worked to a depth of 800 feet on an incline, and when it was closed in 1889, showed considerable copper at the bottom of this shaft.

It will thus be seen, that while the mines of Maryland commanded attention in their day, they have never contained such large masses of mineral as make the western mines profitable. The copper occurs in small quantities, and, while of excellent quality, it has generally cost more than it was worth. While not commercially important, they have produced much that was curious and interesting to the geologist. Carrollite (or cuban, with cobalt in place of iron) is known only from the Springfield and Patapsco Mines, while remingtonite, a rose-colored hydrous cobalt carbonate, occurs at the latter as its sole locality. Native gold, in thin flakes, occurs on foliated magnetite at Mineral Hill, and pyrite, bornite, siegenite and malachite, may be mentioned as occurring in small quantities.

The records of the copper mines in Maryland show that the parties in interest went through their due share of sanguine hope and realized woe. The machinery fifty years ago was crude, assays were unreliable, ready money was scarce, and most of the mines had to be worked in a

semi-rural way, the miners farming during good weather and mining during bad. While, therefore, the product was insignificant as compared with that of the Western mines of to-day, it doubtless represented, in its day, no mean engineering and financiering ability.

Coming now to the smelting and working of copper in Maryland, we find the situation more encouraging. The smelting furnaces at Mineral Hill and Liberty have been mentioned, the former as being in operation prior to 1776 and the latter about 1840. In 1780 John Evans is said to have rolled copper at his mill on Big Elk, in Cecil County. He had an iron rolling and slitting mill, and rolled copper as occasion demanded. It is not said where he got his supply of copper, but it was probably from England.

In 1804 Levi Hollingsworth, one of the Cecil county family of that name, is said to have started a rolling mill, and, in 1810, he produced 100 tons. This is somewhat traditional, but it is known that about this time he went to England and studied thoroughly the rolling and refining of copper, and in 1814 built the Gunpowder Copper Works on the Gunpowder River, eleven miles north of Baltimore. Much of the machinery he brought from England with him, and the works were quite extensive, costing nearly $100,000. There were two sets of sheet rolls, two refining furnaces, and later, a cupola furnace for treating the slag, the power being furnished by a water-wheel. The organization was somewhat bucolic, the men becoming farmers when business was slack, and rolling being apparently abandoned while the crops required attention. The copper itself came mostly in the form of bars or pigs of copper from Chili. These contained about 96 per cent. copper, and were refined on the premises in the refining furnaces. Mr. Hollingsworth ran these works successfully until his death, in 1822, when the McKims, of Baltimore, took charge, in connection with the Hollingsworth family, and ran them until 1837. Then they were reorganized and operated as Hollingsworth & Co., and at the commencement of the war in 1861 were shut down. During this time a large amount of copper was produced and several large contracts filled, the roofing of the original dome of the Capitol of Washington being of Gunpowder copper. In 1833, Griffith, in a description of Baltimore, mentions these works as being quite extensive. He also mentions as one of the sights of the city the copper mill on Smith's wharf, belonging to Isaac McKim, which was notable for being driven by "a stupendous steam engine." This mill was started about 1827, principally for making sheathing copper for ships' bottoms, and ran continuously until 1845. The Ellicott Iron Works, near Ellicott City, also at times rolled copper.

In 1845 the Baltimore and Cuba Smelting and Mining Company was incorporated with Haslett McKim as President and David Keener as

Agent. The company was originally organized to mine and smelt the ores from the Elodie' Mines of Don Bartholomeo Trenard near Santiago de Cuba, he being one of the original promoters of the scheme. A tract of land was purchased on Locust Point, Little Cuba street still remaining as a landmark to indicate the spot, and the erection of furnaces commenced at once. Trenard was made agent of the company in Cuba, and sent out to open the mines and commence the shipment of ore. Early in 1846 the works were ready, but the expected ore did not arrive, and a commission sent to Cuba reported so unfavorably upon the Trenard mines that all connection with him was broken off. At this time Baltimore was largely engaged in trade with the West Indies and the west coast of South America, and the company commenced operations with ores purchased from Cuba and Chili, supplemented with small parcels from Maryland and the neighboring States.

In 1849 a rolling mill was built to enable the company to put part of its product upon the market in a more finished form, and in 1850 a yellow-metal mill was added. In 1849 Dr. Keener left the service of the company and became connected with the rival works just about starting at Canton, on the opposite side of the harbor. The company had not been successful; the failure of the Trenard mines had left it without a regular supply of ore, and the buying of large cargoes of Chilian ore, with the attendant loss of interest and risk of the market during the passage around Cape Horn, had, as a rule, resulted in loss. The management had much to contend with in getting men competent to organize a business which required so much expert knowledge, and after a year of apparent prosperity the deficit became larger until 1851, when it was determined to wind up the concern. The furnaces were demolished, part of the land sold, and finally in 1854 the works themselves were sold. In dismantling the works a very large amount of copper was discovered in the furnace bottoms and also in the slags which had been thrown out. Much of this was shipped to England, and the amount realized was so great that the company was encouraged to re-commence operations. The sale of the works was cancelled, additional capital called in, and in 1855 the works commenced with an enlarged plant. Then came a year or two of rising market and large profits followed by a year of heavy losses. About this time the company became interested in a process for treating sulphuret ores by leaching them with water and then precipitating the copper with iron. Experiments were made at a mine in Virginia, but without success and with considerable loss. About 1860 Clinton Levering became President, and in 1864 the rival works at Canton were absorbed, both being thereafter run by the Baltimore and Cuba Smelting and Mining Company. This rival concern was the Baltimore Copper Smelting Company, organized in 1850, with Dr. Keener as agent and George Brown as

President. Works were built at Canton, where the present copper works now stand, a favorable contract made with a copper mine in Chili, and the company had a prosperous existence until it was finally sold, as stated above, to the Baltimore and Cuba Smelting and Mining Company. Mr. Levering was shortly thereafter succeeded as President by Henry Martin.

In 1868 the works at Locust Point were removed to Canton, the property being sold to the Baltimore & Ohio R. R. Company, and the company reorganized as the Baltimore Copper Company. The changed condition of affairs after the war, the uncertain supply of ore and other causes brought the company into financial straits, and the prohibitive tariff of 1869 was the finishing stroke. In 1870 William Keyser became president in order to wind up the affairs of the company, John W. Garrett and Johns Hopkins being at that time virtually the sole owners.

About this time ores from California, Arizona and Montana began to come upon the market, and the firm of Pope, Cole & Company was formed to operate the works at Canton, George A. Pope and George B. Cole, of the Gunpowder Copper Works, being the general partners, and Johns Hopkins, John W. Garrett, William Keyser, John S. Gilman and G. W. Ward the special partners. The concern now ran altogether upon western ores and did a large and constantly increasing business. In earlier days a sulphuric acid plant had been added in accordance with some crude idea of utilizing the sulphur in the South American ores. This idea had been abandoned and acid was now made from brimstone and sold on the market. The combination of sulphuric acid and copper naturally led to the manufacture of sulphate of copper, or blue vitriol, which became a large branch of the business.

The old Gunpowder Copper Works, at the close of the war, had been incorporated into a company and had started operations again. In 1866 the property was sold to the City of Baltimore in connection with the city water supply. The company then leased the works from the city and ran them until 1883, when, owing to lack of water sufficient to furnish power and the general wearing out of the antiquated machinery, the plant was abandoned and a new and modern rolling mill built at Canton, adjoining the copper works. The name of the company was changed to the Baltimore Copper Rolling Company. In 1885 the firm of Pope & Cole, consisting of the general partners of Pope, Cole & Company, became embarrassed and carried down with it the latter firm. In 1887 the Baltimore Copper Rolling Company was changed into the Baltimore Copper Smelting & Rolling Company, with William Keyser as president, and with an increased capital purchased the business and remaining assets of Pope, Cole & Company. Since that time the business has been actively carried on by this concern. After several years of experimenting an electrolytic plant for the purification of copper by electrolysis

was added. This process had long been a successful laboratory experiment, but it was not until 1890 that it was made a commercial success.

In 1891 the Baltimore Electric Refining Company was organized and a large plant erected about half a mile east of the copper works, and the next year the capacity of the works was doubled. The present plant of the Baltimore Copper Smelting and Rolling Company consists of the copper smelting works, the blue vitriol works, the copper rolling mills, the electrolytic department and the acid works, each run as a separate department. The smelting works consist of calcining furnaces, eighteen reverberatory furnaces, six refining furnaces, two cupola furnaces, a crushing plant and the other necessary adjuncts. The blue vitriol works is one of the largest in the country, supplying last year all the sulphate of copper used by the Western Union Telegraph Company, in addition to large quantities to Paris green makers and others. The rolling mill is especially adapted to the rolling of thin copper sheets, principally for bath-tub manufacturers, and produces about 100,000 pounds per month. The electrolytic department is worked under what is known as the Pierce system, the current being furnished by two Edison 80 K. W. dynamos. The acid works are now restricted to making acid for the blue vitriol and electric works, none being made for sale. The Baltimore Electric Refining Company's works are operated under the Hayden system; they consist of a rolling mill for rolling the anode plates, a large depositing house, the current being furnished by six Edison and three Westinghouse direct-coupled 80 K. W. dynamos, four refining furnaces, a slimes-house for treating the residues and refining the bullion, and the necessary warehouses, repair shops, etc.

These two companies, being virtually under one management, form one of the largest copper works in existence, and the B. C. W. casting copper is recognized as a standard brand, both at home and abroad. The electrolytic copper, which is used for rolling and especially for electric wires, has also made for itself a good name during the short time it has been on the market and is now largely used for trolley wires, a field which promises to push to the utmost for several years to come the capacity of the company to supply the demand. Both these works are now running entirely on copper material from the Anaconda mines at Butte, Montana, and have for several years past handled almost the entire product of these mines put upon the American market, all that is not consumed in America being shipped from Baltimore to the various European ports.

This is briefly the history of copper mining, smelting and manufacturing in Maryland. The deposits of copper are not such as ever to make the mining of it practicable, and the smelting industry, like every other manufacturing business, is subject to change of processes and conditions,

which render it impossible to foretell its future. We have seen that the original operations were based upon supplies of ore from the mines on the eastern seaboard and imported ores from Cuba and the west coast of South America. The former supply failed from scarcity of mineral, and the latter was cut off by the war tariff. The works then languished, all except two on the Atlantic seaboard going entirely out of business, until the supplies of ore began to come in from the far West, seeking smelters where labor and fuel were cheap and where the market for finished product was convenient. This western copper first came in the form of raw ore and later, as labor, fuel and supplies became cheaper in the West, in the form of matte or regulus, which had been through the preliminary processes and contained a higher percentage of copper and a less percentage of waste material upon which freights were to be paid. The rapid settlement of the mining districts of the West, the increased railway facilities and the cheapening of all that enters into the smelting and refining of copper, including the introduction of revolving calciners and the Bessemer converter in place of the reverberatory furnace of the Welsh process, has gone on so rapidly that now refined copper is being shipped from mines from which only a few years ago ore was sent East in its raw condition. All this renders the future of smelting on the seacoast difficult to foretell. The great Welsh smelters are even now feeling the altered condition of affairs, and a change in the copper smelting situation in this country is only a question of a few years. What the effect will be upon the Baltimore works is naturally an interesting question. That there will be a change no one familiar with the business can doubt, but we are certainly justified in the hope that it will tend more and more to increase the copper industry here. Baltimore is peculiarly well adapted to this industry. The mild climate obviates the necessity for substantial and expensively heated buildings, an especial item in electrolytic works; living is cheap, the coal from the Cumberland region is one of the best for smelting purposes, the city is the nearest seaport to the West, and this is an item both in the receipt of raw material and in the distribution of the finished product; the facilities for distribution to New York and northern points are excellent; in fact, the cost of delivering copper to points in New York is very little more than if delivered from works in the immediate vicinity; the frequent sailings and cheap rates to foreign ports of steamers carrying large quantities of grain and cattle and needing heavy freight for ballast, make it an advantageous point for distributing abroad, and the United States is each year becoming more and more the source of the European copper supply. So whether the raw material still comes from the West, or should part of it, under a more moderate tariff, again come from South America, Baltimore has good promise of becoming what several

years ago the London *Times*, in an article on the copper situation in America, predicted that it would become, the Swansea, the copper-smelting seaport of the United States.

### CHROME.

The chrome industry is one of the most unique and characteristic in Baltimore. It originated in the early discovery of chrome ore in the serpentine of Maryland, and has ever since maintained its prestige as one of the sources of the world's supply of the chromates of potassium and sodium, which have many applications in the arts. The following is the substance of an historical account of the Maryland chrome industry, kindly prepared by Mr. William Glenn:

In 1827 chrome ore was first discovered in America on land belonging to Mr. Isaac Tyson, in what are known as the Bare Hills, six miles north of Baltimore. Mr. Tyson's son, Isaac Tyson, Jr., then in business with his father, was persuaded by an English workman to attempt the manufacture of "chrome yellow" from this material, and this was done in a factory on what is now Columbia avenue, in Baltimore, in 1828. In the year of the discovery of the Bare Hill ore, Mr. Isaac Tyson, Jr., who seems to have possessed a very keen power of observation as well as a considerable knowledge of chemistry, recognized in a dull black stone, which he saw supporting a cider barrel in Belair market, more of the same valuable material. Inquiry disclosed the fact that this had been brought from near Jarrettsville, in Harford county, where much more like it was to be found. Mr. Tyson at once examined the locality, and finding it covered with boulders worth $100 per ton in Liverpool, purchased a considerable area.

Finding that the chrome ore was always confined to serpentine, Mr. Tyson began a systematic examination of the serpentine areas of Maryland, which could be easily traced by the barren character of the soil which they produce. A narrow belt of serpentine extends across Montgomery county, and while chrome ore is occasionally found in it (as, for instance, at Etchison P. O.), nothing of economic importance has ever been discovered in Maryland south of the areas known as "Soldier's Delight" and "Bare Hills." Northeastward, however, the deposits become much richer. The region near Jarrettsville was productive, and thence the serpentine was traced to the State line in Cecil county. Near Rock Springs the serpentine turns and follows the State line eastward for fifteen miles. On the Wood farm, half a mile north of the State line and five miles north of Rising Sun in Cecil county, Mr. Tyson discovered in 1838 a chromite deposit which proved to be the richest ever found in America. This property was at once purchased by Mr. Tyson and the mine opened. At the surface it was 30 feet long and 6 feet wide,

and the ore so pure that each 10 cubic feet produced a ton of chrome ore averaging 54 per cent. of chromic oxide. The ore was hauled 12 miles by wagon to Port Deposit and shipped thence by water to Baltimore and Liverpool. At a depth of 20 feet the vein narrowed somewhat, but immediately broadened out again to a length of 120 feet and a width of from 10 to 30 feet. The Wood Mine was worked almost continuously from 1828 to 1881, except between the years 1868 and 1873. During that time it produced over 100,000 tons of ore and reached a depth of 600 feet. It is not yet exhausted, but the policy of its owners is to reserve their ores while they can be elsewhere purchased at a cheap rate. Another well-known chrome mine in this region is exactly on the State boundary at Rock Springs, and is called the Line Pit. So much of this deposit as lay within the limits of Maryland was owned by Mr. Tyson, while he worked the Pennsylvania portion on a royalty.

Other chrome openings near the Line Pit were known as the "Jenkins Mine," "Low Mine," "Wet Pit," and "Brown Mine." This region has proved one of the best in the country for fine specimens of rare minerals. As a mineral locality it is usually given as "Texas, Pa."*

During his exploration of the serpentine belt Mr. Tyson also noticed deposits of chromite sand; and to control the entire supply of this ore, he either bought or leased these also, and worked them to some extent with his mines.

Between 1828 and 1850 Baltimore supplied most of the chrome ore consumed by the world; the remainder came from the serpentine deposits and platinum washings of the Urals. The ore was at first shipped to England, the principal consumers being J. & J. White, of Glasgow, whose decendants are still the chief manufacturers of chromic acid salts. In 1844 Mr. Tyson established the Baltimore Chrome Works, which are still successfully operated by his sons.

After 1850 the foreign demand for Baltimore ore declined gradually till 1860, since which time almost none has been shipped abroad. The reason for this was the discovery, in 1848, of great deposits of chromite near Brusa, 57 miles southwest of Constantinople, by Prof. J. Lawrence Smith, who was employed by the Turkish Government to examine the mineral resources of that country. Other deposits were also discovered by him fifteen miles further south, and near Antioch. These regions now supply the world's demand.

After the discovery of the magnitude of Wood Pit, and of the bountiful supply of sand chrome to be found within the Baltimore region, Isaac Tyson, Jr., began to fear that the sources of supply could not much longer be restricted to his ownership. In such an event, he

* P. Frazer, 2d Geological Survey of Penn., vol. CCC, Lancaster county, 1880; pp. 176 and 192.

realized that he would be compelled to manufacture his ores or to sacrifice them in competition.

The method of manufacture previously in use was to heat a mixture of chrome ore and potassium nitrate upon the working hearth of a reverberatory furnace. The potash salt yielded oxygen to the chromic oxide present, forming chromic acid, which, in turn, united with the base, producing potash chromate. The process was wasteful and exceedingly costly. Afterwards, the process was somewhat cheapened by substitution of potassium carbonate for the more costly nitrate; oxygen was taken from heated air in the furnace. But not until 1845, when Stromeyer introduced his process, was the manufacture of chromic acid placed upon a safe mercantile basis. In this process pulverized chromic iron is mixed with potassium carbonate and freshly slaked lime, and the mixture is heated in a reverberatory furnace. After chromic oxide is set free in the charge, it is freely oxidized because of the spongy condition of the lime-laden charge.

Among the first steps of Isaac Tyson, Jr., was to apply, in 1846, to Yale College for a chemist for his chrome works. In response, a young man named W. P. Blake, who was then a student in the chemical laboratory, was sent. For awhile Mr. Blake did excellent service in the new factory, but he was not willing to remain.

Mr. (now Professor) Blake was the first chemist to be employed in technology upon this continent; while the Baltimore works were the first to appreciate the value of chemistry. After the departure of Mr. Blake, another chemist was secured from the first laboratory ever instituted for the teaching of chemistry, that founded at Giessen by Liebig. In succession came another chemist, from the same laboratory, and this gentleman is yet employed in the works.

Between 1880 and 1890 the American production of chrome ore has varied between 1,500 and 3,000 tons. The total eastern product in 1886 was 100 tons only. Chrome ore was discovered in California in 1873, and since 1886 this State has been the only one to produce this mineral. From two to four thousand tons of Turkish chrome ore are now annually imported into the United States, most of which is manufactured in Baltimore.

## GOLD.

It has long been known that the abundant veins of quartz which penetrate the crystalline rocks of the Piedmont Plateau in Georgia, North Carolina, Virginia and Maryland frequently carry gold. In 1836 Professor W. B. Rogers, then State Geologist of Virginia, devoted considerable space in his annual report to a description of the auriferous rocks.*

*Geology of the Virginias (reprint) p. 74, 1884.

The first gold ever found in Maryland was discovered in 1849 on the farm of Samuel Ellicott, a farmer living near Sandy Spring, on the northern edge of Montgomery county. Specimens from this place were exhibited to the American Philosophical Society by Mr. Justice in that year and described in their proceedings.* Professor Ebenezer Emmons reported on this locality, and gave assays made by the United States Mint of $610, $787 and $168 per ton. Considerable gold is said to have been taken from this locality by parties who paid Mr. Ellicott a royalty of ten per cent.

Most of the Maryland gold mines are, however, situated near the southern edge of Montgomery county, near the Great Falls of the Potomac.† Many claims have recently been developed in this region. The Maryland mine is the oldest in this region, and was opened in 1867. It showed some wonderfully rich specimens, but the gold was so unevenly distributed that it proved only a source of loss to its owners, and was soon abandoned. About 1876 the Montgomery mine was opened on Rock Run and equipped with stamp mill, furnace and other machinery. This company obtained several thousand dollars' worth of gold, but the mine was soon abandoned. It has, however, been recently again developed by a new organization called the Potomac Mining Company.

The most extensive gold deposits occur on what is known as the Harrison Farm, about a mile south of the Montgomery mine, where the metal was first discovered in 1888 by Mr. Kirk, a Georgia miner. Eight veins had been opened on this property in 1890, ranging from $12 to $30 per ton, and had produced a total of $12,000 worth of bullion. The Allerton-Ream mine, 2½ miles east of the Harrison, is near the Potomac, above Great Falls. Several other smaller veins have also been opened in this neighborhood. The Alton mine, Henry Watson manager, is owned in Chicago, and is being fitted out with a 20-stamp mill; the Eagle (operations suspended for the present) has a 10-stamp mill; the Irma, Mr. W. T. S. Kirk, manager, has a 10-stamp mill; the Kirk Mining and Milling Company has a Wiswell mill, with bumping tables and a concentrator. It is owned in Chicago.

Reports are frequent of the discovery of gold in Maryland, north of Montgomery County, as for instance, near Hood's Mill in Howard County, and near Westminster in Carroll County. These finds have not yet, however, proved of any value. It will be noticed, by reference to the geological map, that all of these gold localities lie close to the boundary between the holocrystalline and semi-crystalline portions of the Piedmont Plateau. The quartz veins, which carry the metal, occupy old

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* Proc. Amer. Phil. Soc., vol. V, p. 85, 1849.

† See Notes on the Gold Deposits of Montgomery County, Maryland, by S. F. Emmons, *Trans. Am. Inst. Mining Engineers*, February, 1890.

lines of earth movement (faulting and crushing), and the adjoining rock is usually much decomposed. The gold, according to the observations of Emmons, occurs either in pure quartz, or in association with pyrite, or in the pyrite. It is also sometimes accompanied by lead (galena), silver and telluride of bismuth (tetradymite). According to the Eleventh United States Census, the production of gold in Maryland in 1889 was 501 ounces, worth $10,369, and in 1890, 817 ounces, valued at $16,885.

### GRANITIC ROCKS.

Maryland contains large areas of highly crystalline feldspathic rocks, which are already extensively applied as building stones and for other constructive purposes. The quality of these stones is so good that this industry seems capable of a much larger development than it has heretofore attained. A large proportion of the eastern Piedmont region is composed of the material here under consideration. (See geological map). The most acid or quartzose varieties of these rocks are known as granite and gneiss. Since these differ from one another only in the latter having a more or less pronounced parallel structure, it is not always possible to distinguish sharply between them, especially as true granites often have such a structure secondarily developed in them by pressure.

The regions in Maryland now productive of acid feldspathic rocks are Port Deposit, in Cecil county, the vicinity of Baltimore and Woodstock in Baltimore county, and Ellicott City and Guilford in Howard county. Other districts in Howard and Montgomery counties and in the District of Columbia contain some good stone, but it is quarried only for local use.

According to the returns of the 10th and 11th U. S. Census, the granite produced in Maryland increased 100 per cent. between 1880 and 1890 (from $224,009 to $447,489). In the latter year Maryland ranked as the eleventh State in the Union in granite production. She had twenty-three quarries in operation, yielding 3,371,032 cubic feet, valued at a total of $447,489, and giving employment to 846 men.

*The Foliated Granite of Port Deposit.* The rock which is so largely exposed and so extensively quarried along the north bank of the Susquehanna River, near Port Deposit, is a gray biotite granite-gneiss, *i. e.*, it is a granite with its dark-colored constituents arranged in parallel directions so as closely to resemble a gneiss. Inasmuch, however, as this structure has been in all probability secondarily produced in the rock by intense pressure, the common designation of this stone as "granite" is by no means incorrect. The history of this largest of all Maryland's stone industries is in brief as follows: In the years 1816–'17 the Port Deposit Bridge Company constructed a road and toll bridge across the Susquehanna River, the eastern approach to which was in what is now the

corporate limits of the town of Port Deposit, Cecil county. Much of the granite used in the masonry of this bridge was quarried on the spot, and the quarry thus opened was worked in a small way by Simon Freize, who had supplied the granite for the bridge. About 1829–'30 the business passed into the hands of Samuel Magredy and Cornelius Smith, who enlarged their operations and opened up a considerable trade with Baltimore and elsewhere. Smith retiring, Magredy was left alone in the business until his death in 1844, when E. Wilmer, his son-in-law, succeeded him. Other quarries were opened by other parties and worked with more or less success; and the business is now carried on by Benjamin Kepner and McClenahan & Brother.

Before the development of this industry by Magredy the value of the stone had been known, and large quantities used for making the artificial island on which was built the now abandoned Fort Wood, opposite Fortress Monroe. This granite has been used in the construction of Fortress Monroe, Forts Carroll and McHenry, Baltimore, Fort Delaware, the sea-wall at St. Augustine, Fla., navy yard and dry dock at Portsmouth, Va., Naval Academy at Annapolis, Md., and in the foundation of the Treasury Building at Washington. Also in the construction of the great bridges over the Susquehanna at Havre de Grace, Md.; in the Chestnut Street, Girard Avenue, Callowhill and South Street bridges over the Schuylkill, Philadelphia; in all the principal bridges of Baltimore; in the construction of the new water works crib at Chicago; also for the entire plant of the Maryland Steel Company's works at Sparrow's Point, Maryland. To this list might be added a large number of public and private buildings in Baltimore and Philadelphia.

The output from McClenahan & Bro.'s quarries for the years 1891 and 1892 is as follows:

| | 1891 | | 1892 | |
|---|---|---|---|---|
| | Tons. | Value. | Tons. | Value. |
| Rough Granite....... | 51,400 | $ 70,928 | 37,725 | $ 50,412 |
| Dressed Granite...... | 4,600 | 80,650 | 10,152 | 112,336 |
| Paving Blocks....... | 2,500 | 10,000 | 3,096 | 14,534 |
| Other purposes...... | 2,000 | 6,388 | 16,750 | 17,513 |
| | 60,500 | $167,966 | 67,723 | $194,895 |

In a test of the comparative resistance of various building materials to a crushing strain made by Bvt. Maj.-Gen. Q. A. Gilmore, U. S. Engineer, the Port Deposit granite sustained a pressure of 18,125 pounds per square inch, as may be seen in his report.

The output of the other quarry at Port Deposit for the past three years does not exceed 10,000 tons per annum, valued at $2.50 per ton.

*The Woodstock Region.* The best quality of granite in Maryland occurs in the southwest corner of Baltimore county, near Woodstock. The stone is here remarkably homogeneous in grain and color, which

renders it especially valuable for architectural purposes. The history of this granite region is given as follows by Mr. Attwood Blunt, who has long been associated with it:

"In the neighborhood of Granite, Baltimore county, Md. (formerly Waltersville), about one and one-half miles from Woodstock, is a territory not exceeding two miles in length by about one mile in breadth, on which granite boulders occur. These boulders first attracted attention, and were worked by several enterprising men from New Hampshire, who commenced their operations here about the years 1832–33. Among them were the names Sweatt, Riddle, Putney, Holbrook, followed by many others, among whom were the Emorys, Gaults and Eatons. The principal demand was at first by the Baltimore and Ohio Railroad for stone stringers, dressed to correspond to the flange and tread of the car wheels, and also ashlar, &c., for their bridge and culvert work.

"Although prospecting has been carried on ever since, only two ledge quarries have been discovered, viz: the "Waltersville" and "Fox Rock." The former is the principal one, and was at first called the "Branch." This rock developed into a fine ledge, surpassing all the granite around in quantity, quality and easy access, so that all the boulders in which Sweatt, Putney and Riddle were interested were at once abandoned. After working it for a year or two Putney and Riddle obtained a lease of this quarry for twenty years in August, 1835, from the owner, Captain Alexander Walters, to whose family this quarry has belonged for more than a century. It is called in the lease, and is still known as the Waltersville quarry, although the name of the village of Waltersville was changed to Granite about 1873–74, when the first postoffice at the place was established. The lessees went to work vigorously, and besides many other improvements, built a railroad two miles long to connect with the B. & O. at Putney and Riddle's bridge, about one mile east of Woodstock. Their first contract of importance was furnishing stone for the Baltimore Custom House. They, however, continued the business only a few years. Extravagance and mismanagement caused failure, and they were succeeded by Edward Green and Joshua B. Sumwalt, under the firm-name of Green & Sumwalt. The senior partner dying about the year 1849, he was succeeded by his son Frederick, and the firm became Sumwalt & Green, who conducted the business until 1865, when Attwood Blunt, whose wife owned the property, took charge and continued the business until 1871, when the quarry was leased to Ansley Gill and James McMahon. After a lapse of about sixteen years, the firm was dissolved by the death of McMahon. Mr. Gill continued the business alone for a short while, when he associated with him Wm. H. Johnson, of Baltimore, and they soon after formed with Geo. Mann, Hugh Hanna, Messrs. Grey & Sons, of Philadelphia, and Mr. Hamilton, of Baltimore, a joint

stock company, calling it the Guilford and Waltersville Granite Co. This company is now conducting the business. In Baltimore fully three-fourths of the stone for fine granite work has been procured from this quarry, and in Washington it has also been largely used. Many years ago this stone was extensively used in the Capitol, Patent Office and Post Office buildings. The interior granite work of the Post Office affords as fine a sample of its working qualities as any other work in Washington, unless surpassed by the more recent work on the new Congressional Library Building, the interior court of which has been built of this stone within the past three years.

Shortly after the Waltersville quarry was opened the "Fox Rock" quarry, which is also a ledge quarry, was also opened (1836) and worked by Emery & Gault. But after constructing a railroad to connect with the B. & O. at Woodstock, and bridging the Patapsco there and working the quarry about ten years, they abandoned it, and it remained idle for some time. The bridge and railroad went to decay and have never been rebuilt, although work was resumed in a small way, first by Alvin Eaton about 1869, who continued until it was sold to the Woodstock College. Shortly afterwards the quarry alone was sold by the college to several persons, including the Messrs. William A. and Matthew Gault, of Baltimore, who formed the Woodstock Granite Co. The quality of this granite is excellent. It has been largely used in Baltimore, notably in the B. & O. Central Building, corner Baltimore and Calvert streets, all the granite of which came from the Fox Rock quarry, except a few of the larger blocks, which were obtained from Waltersville. All the granite in the Fidelity Trust and Deposit Building, corner Lexington and Charles Streets, was also furnished by the Fox Rock quarry.

Until within the past fifteen to eighteen years the methods of quarrying and handling stone at these quarries were exceedingly primitive, and consequently slow, costly and inadequate. No steam power had been used except for pumping, and the output from the Waltersville ranged from 30,000 to 50,000 cubic feet per annum. But recently modern appliances have been adopted, particularly at the Waltersville, where a very costly and efficient plant has been built up and steam is used for pumping, hoisting, drilling and sawing the stone, and a steam motor used for transporting freight cars to and from the B. & O., instead of horses as formerly. This quarry can furnish stone of almost any required size, and it would be a comparatively easy matter to quarry out a monolith equal in size to the famous 'Cleopatra's needle.'"

*Ellicott City.* Near Ellicott City, on both the Baltimore and Howard County sides of the Patapsco River, granite is extensively developed, extending far to the southward, and as far east as Ilchester. The quarries on the Baltimore County side of the river show this rock

as a fine grained grey mass, with a decided foliation or gneissic structure. On the opposite side of the river, in Ellicott City itself, it is more homogeneous and granitic. Here it also has a porphyritic structure, in consequence of large flesh-colored crystals of feldspar being more or less regularly disseminated through it. The most perfect varieties of this granite-porphyry present a striking and beautiful appearance.

The principal Ellicott City quarry was opened in 1872 by Charles J. Werner, and since his death in 1888, has been operated by his sons. In 1890 the Werner Brothers purchased a second quarry, which had before been operated by Robert Wilson. The stone occurring so abundantly here was, however, extensively employed at a much earlier date for local use, and even furnished the material of which the Baltimore Cathedral was constructed. Ammendale College, in Prince George's County, and many substantial structures in Ellicott City, are built of it. The production of this stone in 1892 amounted to 28,100 cubic feet, valued at $22,500.

Other granite of excellent quality, and of a somewhat finer grain and lighter color than that occurring near Woodstock, is found at Guilford, in Howard County, but it has not yet received the development it deserves. A red granite, reported from this locality, turned out to be only a superficial staining of the grey stone and of no economic value.

W. F. Weller opened a granite quarry on the Baltimore and Ohio railroad, near Sykesville, and made there, for about eighteen months, Belgian paving blocks. This work was, however, discontinued over a year ago.

In Montgomery County there is also some good granite not yet developed, notably an almost pure white, fine-grained variety at Brookville, and darker varieties near Derwood station on the Metropolitan branch of the Baltimore and Ohio railroad, and near Triadelphia.

*Gneiss near Baltimore.* The more solid varieties of the gneiss occurring in and near the city of Baltimore are extensively quarried for building and foundation stone. This stone is of a dark grey color, and occurs in parallel layers, which present more or less of a contrast. Buildings constructed of this stone, of which there are many in Baltimore, present an agreeable effect.

The oldest and most important quarries of gneiss are those on the east side of Jones's Falls, opposite Druid Hill Park. Other openings in the same rock have been made on Gwynn's Falls, Herring Run, Edmondson Avenue, near McDonogh, and at other places.

The great gneiss quarries on Jones's Falls, north of Boundary Avenue, in Baltimore, were in active operation very early in the century. They are mentioned as early as 1811 as a locality for specimens of certain minerals, of which they have ever since remained a noteworthy source.

A quarry was opened two years ago (1891) in a very granitoid gneiss, occurring beside the railroad, just at McDonogh Station, on the Western Maryland Railroad. It is leased by the McDonogh School to George F. Nardin, who operates it. Of this stone the station houses at Mount Hope and Dolfield's, above Owings' Mills, have been built. It is also used for road ballast, Belgian blocks, sills, steps, etc.

A few of the other crystalline siliceous rocks occurring in the Piedmont region of Maryland have received some application as building stones, although this is in all cases very limited.

*Gabbro.* The black trappean rocks, described on p. 39 as abundant in Harford, Baltimore and Howard counties, weather into a deep red soil, in which rounded boulders of the unaltered rock occur. These are locally known as "niggerhead," and as they have to be cleared out of the fields, they are extensively employed in building stone walls, foundations, etc. They are now rarely used for the construction of whole buildings, although in the case of the railway station at Arlington and a church at Woodbury this has been done. The rock is so extremely hard and tough that it cannot be economically quarried or dressed; it is, therefore, always used in the form of natural boulders. As a material for macadamizing roads it is said to have no superior.

*Amphibole Schist.* On the property belonging to the Alms House in Westminster, Carroll county, a quarry has been opened in a compact, finely crinkled amphibole schist, somewhat resembling an impure soapstone, which has been used, with good effect, as a building stone. It was first employed in the construction of the Keyser Memorial Church at Reistertown. It is of a pleasing grayish green color, even texture, and is easily worked. It has since been used for the residence of the president of Western Maryland College at Westminster.

## SANDSTONE.

Sandstone is a name given to beds of sand, like those now being formed along the seashore, which have been consolidated into rock by the deposition of some cementing material between their grains. The sand itself is usually in large part quartz, mixed with varying proportions of other mineral fragments. The color and durability of a sandstone depends in great measure on the nature of its cement, and according to what this is, sandstones are classified as siliceous, calcareous, ferruginous, etc.

Sandstones occur in all geological deposits of sedimentary origin, and are consequently of all ages. There are many sandstone horizons in Maryland, as may be seen by reference to the geological map. Many of these are well suited to furnish valuable building stones, but as yet only one locality has furnished this material for more than local use.

*Seneca Red Sandstone.* This is at present the only Maryland sandstone which possesses a recognized reputation in the market. The formation from which it is obtained is of triassic age and is extensively developed along the eastern edge of the United States. It furnishes most of the red and brown freestone so extensively used for house fronts in New York and other large cities. There are extensive quarries in this formation in Massachusetts, Connecticut and New Jersey. A belt of this rock enters Maryland between Emmitsburg and Union Bridge, rapidly narrowing toward Point of Rocks, while another area occupies the southwestern part of Montgomery County (see geological map). The only extensive quarries of this sandstone in Maryland are situated at the mouth of Seneca Creek, in Montgomery County, on the Chesapeake and Ohio Canal.

The Seneca sandstone has been quarried in a more or less systematic way since 1774, when it was used in the construction of two locks on the old Potomac Canal, built round the Great Falls of the Potomac. In 1832 it was used in the locks of the Chesapeake and Ohio Canal, and also in an aqueduct on the same canal near the mouth of Seneca Creek.

About this time, or soon after, the quarries became the property of Mr. Robert Peter, who continued to develop them, furnishing, in 1847, the stone of which the Smithsonian Institution is built. In 1867 Mr. Peter sold the quarries to Mr. H. H. Dodge, who organized the original Potomac Red Sandstone Company. This company greatly developed the quarries and marketed a large amount of the stone, principally in Washington. In 1874 the company became involved in litigation and the quarries were closed for nine years. In 1883, however, the company was reorganized, and the work pushed rapidly forward down to June, 1889, at which time the canal, upon which the company depended for transportation, was washed out and the quarries lay idle for a period of two years. In 1891 Mr. George Mann, of Baltimore, purchased the property and founded the present organization, "The Seneca Stone Company," which has since worked the quarries.

Since the present company took charge of the quarries a force of sixty men has been kept busy, but the work has been mainly development.

The production since the present company has worked the quarries has been as follows:

| | Cu. Ft. | Cost of Production. | Value. |
|---|---|---|---|
| 1891 | 1,717.5 | $ 3,497 32 | $ 3,269 84* |
| 1892 | 20,208.9 | 10,301 51 | 25,168 81 |

The stone has always been a favorite one with builders, not only because of its great strength and durability, but also because of the ease

*From March 15 to September 1.

with which it is worked and its beautiful colors. When first quarried the stone is comparatively soft and susceptible of very delicate carving. It, however, soon hardens on exposure.

Before the Seneca stone was adopted for the Smithsonian Buildings it was subjected to thorough tests by Prof. David Dale Owen and Dr. Page. It has also been since tested and reported on by Prof. James Hall, and by Mr. Adolph Cluss, engineer, of Washington, all of whose reports have been most favorable. Its strength was determined by the engineers of tho U. S. Army as 10,762 pounds resistance to the square inch. Mr. G. P. Merril, head of the department of lithology in the U. S. National Museum, "does not hesitate to pronounce it one of the best of our Triassic sandstones. On blocks of the stone in the aqueduct of the Chesapeake and Ohio Canal, which have been constantly permeated by water every season for fifty years, the tool marks are still fresh, and no signs of scaling are visible other than those produced by too close contact at the joints."*

Besides the Smithsonian Buildings, a number of important structures have been constructed of this stone in Washington and Baltimore.

Several other sandstone horizons in Maryland are quarried locally, and some of these furnish material of such good quality that they may become important sources of building stone. These sandstone deposits belong to the series of Paleozoic sediments (see p. 44 and map), the most important being, Cambrian (I), Medina (IV), and Oriskany (VII).

*Micaceous Sandstone of Deer Creek.* On the south side of the infolded area of semi-crystalline schists surrounding the Peach Bottom slate area, in Harford county, is a strip of very hard and massive sandstone, which has been greatly metamorphosed by the dynamic action to which it has been subjected. This narrow band forms a pronounced ridge, which has been cut through at its highest point by Deer Creek, exposing the hard sandstone in precipitous walls over 350 feet in height. This spot has long been known for its romantic beauty. The Baltimore & Lehigh Railroad now passes through the gorge, where there is a station known as "The Rocks." The stone is a nearly pure quartz sandstone, in places plainly conglomeratic, and contains more or less white mica (muscovite), chlorite and kyanite, which are products of secondary crystallization due to metamorphism. The whole occurrence presents a striking resemblance to Wills Mountain, Buckingham county, Va., described by W. B. Rogers.† The geological age of this Harford county sandstone is not definitely known, but from its relation to the Peach Bottom slates it seems probable that it is highly altered Cambrian.

* Stones for Building and Decorations, 1891, p. 262.

† Geology of the Virginias, 1884.

The fire-proof qualities of this micaceous sandstone have long been recognized, and it has been frequently employed for hearth-stones and furnaces. Quite recently a company has been organized to develop it as a building stone, basing their claims for its success on the inexhaustible supply, hardness, durability, white color and fire-proof qualities. This corporation is called the "Maryland Granite Company," although their stone is neither in character, origin nor appearance even remotely related to granite. Their capital is $200,000, and they are erecting improved machinery for the extraction and shipment of the product.

*Cambrian Sandstone.* The Cambrian sandstone, which forms the base of the Paleozoic series, occurs in an unaltered condition in Sugar-Loaf, Catoctin and Blue Mountains. It is quarried for local use by railroads, canals and road commissioners, and to a small extent for building. At the south end of Sugar Loaf Mountain, near Dickerson Station, it was employed for bridges, aqueducts and culverts by the Baltimore and Ohio Railroad and by the Chesapeake and Ohio Canal. On the farm of Mr. Belt, near this place, a beautiful white sandstone has been opened which seems worthy of further development. The Western Maryland Railroad has used this sandstone in Catoctin Mountain above Mechanicstown.

*Medina and Oriskany Sandstone.* The only other sandstone quarries in Maryland that deserve mention are near Cumberland, in Alleghany county. Will's Mountain, to the west of the city, is composed of compact white Medina sandstone, overlying the lower red Medina. The white sandstone is 500 feet thick. It was obtained from detached boulders, for steps, curbs and architectural trimmings, but was not regularly quarried until 1891, when Messrs. Beale Brothers opened the stone in the Cumberland Narrows above the railroad. Their production during 1892 was:

| | | |
|---|---|---|
| Building Stone............. | 1,860 cubic yards | $1,860.00 |
| Gannister.................. | 4,692 tons | 1,642.00 |
| Ballast.................... | 660 cubic yards | 330.00 |

Prof. C. F. Chandler states that this rock contains 98.35 per cent. of silica. Another sandstone which has been quarried at Cumberland, belongs to the Oriskany horizon. This is of a yellow color, and while often soft and pliable, yields hard and compact layers which are suitable for building stone. The Methodist Episcopal church in Cumberland is constructed of this stone, and it shows admirable resistance to atmospheric action.

*Archaean Quartz-Schist.* In Baltimore County a foliated quartz-schist occurs along the edge of the marble belts, (p. 37). It is a hard resistant rock and therefore forms prominent ridges. Though it belongs to the most ancient part of Maryland and forms one of the holocrystalline series, it was probably once a sandstone. It is divided by parallel layers

of mica into thin slabs, which are covered with curiously broken and stretched black tourmaline crystals.* It is quarried along the southern edge of the Green Spring valley, and employed for foundation or flagstones.

## SLATE.

One of the best known roofing-slate regions in the United States is that called the Peach Bottom district in Lancaster and York counties, Pa., and Harford county, Md. The slate belt forms a narrow zone which begins a short distance east of the Susquehanna River in Lancaster county and passes in a southwest direction through the southeastern corner of York county, terminating near Pylesville, on the Baltimore and Lehigh Railroad, Maryland. The age of these slates has been determined, upon fossil evidence, to be that of the Hudson River horizon of the Lower Silurian.† They form a narrow, overturned synclinal fold in the centre of the tongue of semi-crystalline rocks which extends from Pennsylvania at the Susquehanna River to the neighborhood of Finksburg, Carroll county. (See geological map.)

The slates of the Peach Bottom region were worked as early as Revolutionary times, and show almost no change after an exposure of one hundred years. One old mine was formerly operated in Lancaster county, Pa., but at present almost all the active quarries are in Harford county, Md. They are for the most part owned by persons who superintend them and who reside at, or near Delta, Pa. The slate companies are so constantly changing hands and undergoing reorganization that it is impossible to give any connected account of their history. In 1880 Prof. Persifor Frazer gave quite an extended account of these quarries in his report on the geology of Lancaster county.‡ He enumerates eight quarries as then in operation in Maryland. The 10th U. S. census gives the slate production of Maryland for the year ending May 31, 1880, as 12,280 squares, valued at $56,700.§ In this production the State was fifth, being exceeded only by Pennsylvania, Vermont, New York and Maine. The statistics of the 11th U. S. census place Maryland's slate production for the year 1889, from five quarries, at 23,029 squares, with total value of $110,009. In this she was exceeded only by Pennsylvania, Vermont, Maine, New York and Virginia.||

At the present time there are in operation in the Peach Bottom belt in Harford county six quarries.

The Peerless Slate Company, E. M. Aiken, president, have large quarries near the Baltimore and Lehigh Railroad. Cambria, Md., is their

* See Guide Book "Baltimore," issued for the Am. Institute of Mining Engineers, Feb. 1892.

†Trans. Am. Inst. Mining Eng. Vol. XII, p. 355, 1883.
Second Geol. Surv. Summary Final Report. Vol. I, p. 617, 1892.

‡Second Geological Survey of Pennsylvania, Report CCC, Lancaster Co., 1880, pp. 182-190.

§Mineral Resources of the U. S., by Albert Williams. U. S. Geol. Surv., Washington, 1883, p. 452.

||Mineral Industries of the U. S. at the 11th census, by D. T. Day, Washington, 1892, p. 662.

shipping point, and Delta, Pa., their office. Their product is shipped all over the United States, and for the past three years has been as follows:

| | Squares. | Value. | Mantels, Tubs, &c. Value. | Total. |
|---|---|---|---|---|
| 1890 | 5,225 | $24,446 | $3,138 | $27,584 |
| 1891 | 7,293 | 35,916 | 3,169 | 39,085 |
| 1892 | 7,433 | 36,600 | 3,183 | 39,783 |

The Excelsior Slate Company, R. L. Jones, president, now operate the property formerly owned by W. A. McLaughlin and known as the Eureka quarry. The present corporation commenced operations August, 1891, and from that time until the end of 1892 they produced 6,322 squares of slate, valued at $31,658.

The York and Peach Bottom Slate Company, A. S. Edy, president, produced about 8,000 squares of slate per annum. They were succeeded November, 1892, by Herr & Bennett, who are now operating these quarries.

The Cambria Slate Company, owned by V. G. Stubbs & Son, produced 1,100 squares of slate in 1891 and 920 squares in 1892.

The Harford Peach Bottom Slate Company, J. Humphrey, president, and the Proctor Brothers' Slate Company, are the other owners of Harford county quarries, but their production has not been ascertained.

Another deposit of roofing-slate occurs near Ijamsville, on the Main Stem of the Baltimore and Ohio Railroad, in Frederick county. Quarries were opened there over sixty years ago, but were never extensively worked. This property has recently been purchased by Edward Pels, of Baltimore, who intends to develop it more extensively in the near future.

### MARBLE AND LIMESTONE.

The deposits of marble and limestone, which are abundant in the central and western portions of Maryland, differ widely in geological age and lithological character. As a result of this they have naturally been applied to a variety of different uses. The most important of these are as follows: Building stone, decorative stone, flux, commercial lime for plaster and agricultural purposes, hydraulic cement, and an ingredient of asphalt paving blocks.

There is no limestone in eastern Maryland, nor in any of the State's geological formations younger than the trias. The oldest limestones are the most coarsely and perfectly crystalline, being white marbles; those of the western or semi-crystalline portion of the Piedmont Plateau, are fine-grained, compact, and often variegated marbles, while those of the valleys farther west are but little altered, blue, fossiliferous limestones.

*Building Stone.* The most valuable of Maryland's limestone deposits are the highly crystalline marbles of Baltimore County. Reference to

the geological map will show that these rocks have an extensive development in a series of narrow belts to the north and west of Baltimore. The only locality, however, which is economically important, is the broad belt which extends from Lake Roland northward to Cockeysville, and which is traversed by the Northern Central Railroad. Marble is extensively quarried at Texas and to the west of Cockeysville, near the northern portion of this belt. At the first of these places it is obtained for burning or for flux, while the other, well known as the Beaver Dam Marble Quarries, has long been successfully operated for building stone. The marble at these two localities, so near each other and in the same geological formation, presents some marked differences. Chemically the Texas marble is a nearly pure carbonate of lime, while that from Cockeysville is a dolomite. The long series of analyses which are constantly being made of the Texas rock by the Maryland Steel Company, where it is used as a flux, show that it does not average over five per cent. of carbonate of magnesia; a number of analyses of the Beaver Dam product, on the other hand, give the average amount of this substance as high as forty per cent. This discrepancy is as remarkable as it is unexpected. Another contrast is shown by the marbles of these two localities in their relative coarseness of crystallization. The Texas stone is coarsely crystalline, often so markedly so as to procure for it the special designation "alum stone." This renders it nearly worthless for building purposes, since its crushing strength is very small. The Beaver Dam rock is compact, hard, fine-grained and proportionately strong. There is also some of the finer-grained rock at Texas, where an attempt is now being made to develop it for a building stone.

The quarries now operated by the Beaver Dam Marble Company, near Cockeysville, Baltimore County, have been worked for over seventy-five years. The marble used in the construction of the Washington Monument in Baltimore was taken from this locality as early as 1819. One of the first owners of this marble property was John Baker, who did much toward developing it. At his death it passed into the hands of his son-in-law, James B. Connelly, who left it to his sons, Messrs. J. B. and T. F. Connelly. It was acquired by its present owners, the Beaver Dam Company, of which Mr. Hugh Sisson is president, about fifteen years ago. The product of this locality, where there are two or three quarries, is a finely saccharoidal dolomite of great compactness and durability. It contains occasional accessory minerals which represent old impurities which have crystallized as silicates. The most common of these is a copper-colored mica in small scales (phlogopite), which occurs in horizontal bands representing the original bedding of the rock. Other minerals, like quartz, tremolite, etc., present occasional defects in the

stone and obstructions to working it. They are popularly known as "flint."

The company employs about 200 men and has a large plant of the most improved machinery. The marble occurs in nearly horizontal beds and in quarrying, channelling machines are used to saw out the blocks. By means of diamond drills and wedges these blocks are then lifted free. In this manner blocks twenty-eight by ten by three feet have been quarried entire.*

Such blocks are, however, too large to be transported, and are usually broken up. The largest single pieces shipped from the quarries were 108 columns each twenty-six feet long, which were used in the Capitol at Washington. The greater portion of the stone is now dressed before shipping, as the company has a large saw-mill at the quarry.

The U. S. Government tests, made by Lieut.-Col. Q. A. Gilmore, show that for durability and strength it is unequalled, its compressive strength being 22,416 pounds to the square inch, which is greater than that of any other marble or limestone, while its absorption of water is so slight as to be practically nothing. It is of fine-grained texture and of a clear white color, and is quite free from discoloring agents. This fact, together with its non-absorbent qualities, establishes the durability and permanency of its color.

The stone has been quite popular with architects and builders and has been very largely used, especially in the cities of Baltimore, Washington and Philadelphia. Perhaps the most practical test which has been made of the strength of this marble was its use as material for the Washington Monument, Washington, D. C., the highest stone structure in the world. In this monument 163,724 cubic feet of Cockeysville marble were used, at a total cost of $221,275.02. As an instance of the superiority of this marble, it might be mentioned that in the Metropolitan Club, of New York, 40,000 cubic feet of this stone were used, all of the very finest quality. The Peabody Institute, in Baltimore, shows the stone to good advantage. Among other buildings in which it has been used may be mentioned: U. S. Postoffice, at Washington; Maryland Club, Rialto Building, City Hall, Eutaw Place Baptist Church, Brown Memorial Church, etc., in Baltimore; Drexel and Penn Mutual Insurance Buildings, in Philadelphia; the spires of St. Patrick's Cathedral, in New York, etc.

The output for the years 1889-'91 was as follows:

| | Cubic Feet. | Value. |
|---|---|---|
| 1889 | 277,000 | $119,675.00 |
| 1890 | 280,000 | 130,000.00 |
| 1891 | 220,000 | 106,000.00 |

* Merrill: The collection of building and ornamental stones in the U. S. National Museum, p. 378.

Beside the marble furnished for building purposes, large amounts are used for doorsteps, lintels, facings, flags, rubble, ballast, etc.

In June, 1892, Messrs. L. B. McCabe & Bro. took charge of a quarry located at Texas, which had before been worked only for rough stone to be burnt into lime, and proceeded to develop it for building stone. Since then a force of thirty-five men, with improved machinery, has been employed, mostly in preparatory work, in the course of which some 3,000 tons (value $15,000) of rough stone have been taken out and used in the Belt Line tunnel. The stone is to be used in the construction of the North Avenue viaduct. Stones of large dimensions can be easily obtained, and have already been quarried here 32 feet 2 inches by 3 feet 10 inches without a flaw or crack. The marble is a little coarser grained than that obtained at Cockeysville, and is easily worked.

Other limestones quarried in Maryland for building stones have only a local use. The blue Trenton limestone of the Cumberland Valley is used in Hagerstown to some extent, where the Protestant Episcopal and Methodist Episcopal churches are good examples. In other localities in Harford, Carroll and Frederick counties, where good limestone occurs, it is often seen in buildings.

*Decorative Stones*. The marbles of Maryland have never yet been applied to any extent for the purpose of interior decoration, although some of the finer grained and compact varieties from Carroll and Frederick counties compare favorably in their quality, texture and beautiful veining with well-known marbles from Vermont and Tennessee. In the Wakefield valley, west of Westminster, a beautifully mottled red and white marble occurs; others with a black and white, grey and white, or blue and white veining occur near New Windsor and Union Bridge. These stones would seem to be deserving of more attention than they have heretofore received.

Another stone which may be classified as a limestone on account of the high percentage of lime which it contains, is the conglomerate or breccia of triassic age found in the Frederick valley. It is known as "Calico rock" or "Potomac marble," and has received one noteworthy application as a decorative stone in the old Hall of Representatives in the Capitol, where it forms a series of beautiful columns. This stone was first brought into notice by Benj. H. Latrobe, who observed it in the Loudon Hills, Virginia. It occurs well exposed at Washington Junction, Frederick county, and extends northward along the base of Catoctin Mountain as far as Frederick and beyond. It consists of large angular and sub-angular fragments, mostly of the Trenton limestone, although many other rocks like quartz, slate, granite, porphyry, etc., also occur, imbedded in a red ferruginous cement. The unequal hardness of its components and the readiness with which they become detached from

the cement makes the working and polishing of the stone difficult, and has interfered with its general application.

A quarry of very compact, even-grained and pure cream white marble was opened just below Edgemont Station, in Washington county, on the east side of the Hagerstown valley, but it has never been adequately developed. The quality of this stone seems to be very good.

*Flux.* Limestone and marble is largely obtained in Maryland as flux for blast furnaces. The largest industry of this sort is at Texas, Baltimore county, where the Standard Lime and Stone Company of Buckeystown, Frederick county (Daniel Baker, President), have a large quarry, from which they ship on an average 400 tons daily to the Maryland Steel Company, at Sparrow's Point. The Catoctin Iron Furnace, in Frederick county, formerly obtained its flux from extensive limestone quarries at Cavetown, on the Western Maryland Railroad, on the opposite side of the Blue Ridge.

*Quicklime for commercial and agricultural purposes.* Before transportation facilities had become as numerous and cheap in Maryland as they are now, the numerous limestone deposits were largely quarried for burning to supply a local demand. The demand is at present, however, more economically supplied by a concentration of this industry, and the old quarries and kilns scattered so widely over the country are for the most part abandoned. The most extensive lime burning in Maryland is done at Texas, Baltimore county, where Mr. Parks, the principal operator, estimates the average yearly production of the twenty kilns at 200,000 bushels, having a value of $28,000. Most of this is building lime. A good deal of lime was formerly burned at Loch Raven for whitewashing purposes, and sent to the Baltimore market. This has, however, recently declined, and in 1892 not more than 5,000 bushels were produced.

The burning of limestone for agricultural purposes is still carried on to a considerable extent in the Frederick valley. The stone is, however, too much covered with overlying soil, to be economically worked. The best deposits are nearly exhausted. Some of the largest companies of this region have transferred their operations to more favorably located deposits situated outside the State. Mr. Daniel Baker, President of the Standard Lime and Stone Company, makes the following statement: "The largest limestone deposits of the State of Maryland have been worked to their most profitable point, and beyond; sufficient remains, inaccessible for quarrying, to make a large area of land valuable for farming purposes."

The limestone quarries, near Westminster and New Windsor, as well as those near Cavetown, still furnish some stone for burning.

CEMENT.

Hydraulic cement is manufactured at three points within the State of Maryland. The two oldest and most productive of these—Cumberland and Hancock—obtain their material from the Silurian limestone beds called Lower Helderberg (" Water-lime group " of New York State), while the third has its quarries in the older Trenton limestone beds of the Cumberland valley, near Sharpsburg.

Hydraulic cement was first manufactured at Cumberland in 1836, and its production is now carried on by the Cumberland Hydraulic Cement and Manufacturing Company. Their quarries are on the south bank of Wills' Creek, where the Helderberg rocks are finely exposed, and where a series of natural folds in the beds allow of the easy and convenient working of the rock. The product has an excellent reputation for quality, strength and durability, and is largely employed in government and railroad works. It is used pure, as concrete, mortar or grout. The production of these works has varied greatly. According to the 10th U. S census it was in 1880 only 4,000 barrels, while in 1890 it was 137,540, in 1891 124,194, and in 1892 157,038 barrels.

The Potomac Cement Company of Cumberland has recently constructed a mill with a capacity of 500 barrels per day. A large body of cement rock of first-rate quality near the city has not as yet been developed.

The hydraulic cement works near Hancock, Md., are now operated by Bridges & Henderson. The rock is the same as that quarried at Cumberland, and it is here also folded so as to be conveniently and economically obtained. The works and quarries are on the Chesapeake & Ohio Canal at a place called Round Top, about three miles southwest of Hancock.

This deposit of cement rock was first discovered by Mr. A. B. McFarlan in 1837. This gentleman was then engaged in the construction of the Chesapeake and Ohio Canal, and recognized the valuable quality of this material for the work in hand. It was used in the construction of aqueducts along this part of the canal, and afterward in the Capitol extension in Washington.

From their discovery till 1862 the Round Top cement works were operated by Mr. George Shafer. At this time they were purchased by Bridges & Henderson, who still manage them. They employ seventy-five men and have a capacity of 300 barrels daily. Their product is shipped in barrels, bags and sacks, containing 300, 100 and 50 pounds respectively. During the past three years it has averaged 60,000 barrels per annum.

The only manufacturers of cement from the Trenton limestone in Maryland are the Antietam Cement Company, whose headquarters are at Hagerstown. This rock is, however, extensively employed for this purpose farther north in Pennsylvania and near Shepherdstown, W. Va.

This company commenced operations in 1888. Their quarries are on the Chespeake and Ohio Canal, a few hundred yards from the bridge of the Norfolk and Western Railroad over the canal and river. They therefore belong to the Shepherdstown cement region. This company now sells about 20,000 barrels annually.

## ASPHALT BLOCKS.

One of the uses to which Maryland limestone has been applied in the last few years is in the manufacture of asphalt blocks for street paving. These blocks are composed of crushed and pulverized limestone, Trinidad asphalt, and a residuum of petroleum, heated separately, thoroughly mixed and combined under heavy pressure. Hard limestone is crushed and pulverized until it will all pass through a screen of ¼-inch mesh, about one-third of the whole being reduced to powder. This stone is then heated to about 260° Fahrenheit, and is thoroughly mixed with 10 per cent. of its own weight of Trinidad asphaltum, heated to 280° Fahrenheit. The limestone dust combines with the liquid asphalt, forming a bituminous and calcareous cement, with which all the larger particles of stone are coated. The material is finally delivered to the press at a sufficiently high temperature to cause all the particles to adhere one to another when subjected to the heavy presssure, thereby producing a practically homogeneous and solid block. The pressure applied to each block is not less than one hundred tons. The blocks are transferred from the press to a bath of cold water, from which they are taken and piled into stock for use.

These blocks are used for street and sidewalk pavements, and have important advantages in that they are durable, comparatively noiseless, non-absorbent, smooth, do not become slippery when wet, and are considerably cheaper than granite blocks.

They have been laid and are used extensively throughout the country, but especially in Washington and Baltimore. There are about 300,000 square yards of street pavement of this kind in Washington and about 200,000 square yards in Baltimore, as well as a large amount of private work.

The factory of this company, known as the Maryland Pavement Company, was erected at Fulton Station, Baltimore, in 1882, and for the first five years manufactured about one and a half million blocks each year, and since then about three million blocks per year. The company owns quarries near Westminster Md., from which they took in 1892 about 15,000 tons of limestone. In addition to this they used a large quantity of limestone from other quarries in the State.

## SERPENTINE.

This rock, which from the earliest times has been highly prized for architectural and decorative purposes, is essentially a hydrous silicate of magnesia and iron. It is, moreover, always the product of alteration of other minerals, but itself possesses the two valuable properties of beauty and permanence. Serpentine is classified commercially with marble, because serpentine deposits often occur in, or associated with marble. The two rocks are, however, in composition, appearance and generally in origin, quite distinct. The serpentine, which occurs in large masses suitable for quarrying, is very impure. It contains many other minerals in varying proportions, which produce, in the stones of different localities, a wide range of hardness, color and general appearance. Serpentine is employed sometimes as a building stone and sometimes is polished for interior decoration.

An extensive development of lenticular serpentine beds stretches along the east flank of the Appalachians, from Vermont to North Carolina. It is quarried at many points. In southeastern Pennsylvania, especially in Chester county, serpentine is obtained for building and is extensively employed in Philadelphia, Baltimore and Washington for this purpose. The serpentine at present obtained in Maryland is used only for decorative purposes.

The principal quarry of the State is on Broad Creek, near Dublin, in Harford county. The rock is here of remarkable hardness and beauty. Blocks and slabs of large size can be sawn out, and are capable of a fine lustrous polish. Its color is a rich emerald green, semi-transparent, and clouded with darker streaks by included magnetite. It is of the variety sometimes called precious serpentine. The product of this quarry is called *verd antique,* although in the strict sense, this is not correct. A full geological and chemical report was made on this stone in 1875 by Prof. F. A. Genth, of the University of Pennsylvania, for the Green Serpentine Marble Company of Harford county. In 1880 extensive preparations were made for developing the quarry and introducing the stone. In spite of its durability and beauty, these have, however, been only partially successful because of the hardness of the material and the expense of extracting and polishing it. Still it has been used for the interior decoration of several large buildings in New York, Philadelphia, Washington, Wilmington, St. Augustine, and elsewhere. This property has changed hands a number of times within the past ten years. The Serpentine Company of Harford county, with headquarters at Wilmington, Del., operated it between 1888 and 1890, but at present it is inactive.

There are several other deposits of serpentine which may become productive, though, at the present time, only preliminary examinations of them have been made. Near Rock Spring, in the northern part of

Cecil county, there is a deposit of semi-transparent or precious serpentine. A quarry was opened, not long since, near Cambria, in the Peach Bottom slate region, in the northern part of Harford county, while the stone is abundant near Cooptown and Jarrettsville, in the same county. Just north of Baltimore city, on the Falls road, near Cold Spring avenue, serpentine is quarried for road ballast, and a few miles beyond, at the Bare Hills, near Lake Roland, it has recently been explored, to a considerable extent, with the intention of producing it for decorative purposes. The Lake Chrome and Mineral Company have a quarry there, with machinery for cutting and polishing it. Just to the west of their property Mr. McCoglan has also made three borings, with a circular drill, which have furnished cores of satisfactory stone to a depth of 100 feet. Near the Northern Central Railroad, at Whitehall, some Chicago parties have recently made some openings for the purpose of ascertaining the quality of the serpentine there.

Serpentine is also abundant at the "Soldier's Delight," west of Owings' Mills, and through Montgomery county, but it has as yet been only explored in these regions with reference to chrome ore.

### SOAPSTONE.

Soapstone is a compact variety of talc, a hydrous magnesia silicate, which has many applications in the arts. It is produced in New Hampshire, Pennsylvania, New Jersey, Virginia, Vermont and Maryland. According to the statistics of the eleventh census, Maryland's production was in 1889, 432 short tons, valued at $4,321.

The only productive quarry in Maryland was opened in the fifties, in Carroll county, one and one-half miles northwest of Marriottsville. The stone is of a good quality and was sawed into slabs by the old company for the manufacture of bath-tubs. It did not pay, however, and in 1860 was abandoned.

In 1885 the present "Maryland Soapstone Company" commenced to operate this quarry with the intention of also sawing the stone. As it was found that this could not be done with profit, the product is now for the most part ground and sold to manufacturers of fire-proof and acid-proof paints. Some slabs are, however, sawed out for fire-brick and hearthstones. The product of this quarry in 1892 was 372 short tons, valued at $1,860.

Other occurrences of soapstone are known to exist, but they are as yet undeveloped. At Indian Hill, two miles northwest of Washington, such a bed occurs and others near Tennallytown, and on the Woodley Lane road.* A soapstone quarry was also opened on the property of the Serpentine Company, of Harford county, but it has never been developed.

* G. P. Merrill: Handbook of building-stones in the National Museum, 1889, p. 358.

## CLAY-WORKING INDUSTRIES OF MARYLAND.

Clays constitute an interesting and important feature of the economic geology of Maryland, and form the basis of industrial operations of considerable magnitude, embracing the manufacture of building brick, terra-cotta and tile-work, fire-brick and pottery. The workable deposits of clays suitable for building brick extend over a large area of the State, but are of more particular interest in the eastern section, where the existence of the principal markets has induced the most extensive development. As Baltimore is the chief city and the centre of the most populous section of the State, it naturally is also the centre of the largest brick-making industry, this being made more readily possible by the presence of an abundance of building-brick clay of superior quality in the city and its immediate suburbs. Building bricks are manufactured at numerous other points in Maryland, but as the industry has reached its largest development in Baltimore and vicinity, a consideration of the conditions there existing will suffice for the State at large. Brick-making has been an industry of consequence in Baltimore nearly as long as the city has existed, and several of the present firms have been in business since the early years of this century. There are about forty yards now in operation, and their annual output of brick of all kinds averages 150,000,000. The larger portion of this product enters into local consumption, although there is a considerable trade with cities further south on the coast.

The clays from which Baltimore bricks are made belong to the Columbia formation, which appears in the northeastern section of the city, between northwest harbor and Middle Branch and southeast of Mt. Clare, and the Potomac formation, which is most prominent in the south-west section and beyond, especially about Orangeville and on the hills north of Camden Junction. The Columbia formation presents its usual characteristics, consisting of yellow to brown loam or clay, grading downward into gravel or boulders. The bricks made from this clay in Baltimore resemble the bricks made from the Columbia clays in Eastern Pennsylvania and New Jersey. Southwest of Baltimore the Potomac clays outcrop and are prominent in a broad belt across the State. The beds of Potomac clay in the southwestern part of the city were the first to be worked, and the exhaustion of the beds within the city proper is gradually moving the industry into the suburbs. A ridge of iron-ore clay, a short distance outside of the city, is being largely worked at present with excellent results. This clay is very strong, stiff and close, and it carries good deal of carbonate of iron in nodules and lumps. The iron ore is picked out and sold to the few old charcoal iron furnaces in the vicinity that continue their dependence upon this ore. The bricks made from this iron-ore clay are exceedingly heavy, tough and close

grained, and but slightly porous. Owing to the weight and stiffness of this clay the manufacturers of these bricks assert that it costs more to make them than any other bricks of corresponding quality made from other clays. Experiments have been made with common rough red bricks made from this iron-ore Potomac clay to determine their utility for paving purposes. Although no record has been kept it is stated that these bricks have given satisfactory results in this service. Bricks made from this clay have been used in large quantities for the lining of the Belt Line tunnel, which passes underneath Baltimore.

The brick-yards about Baltimore are well equipped with modern methods and appliances, most of the brick being made by machinery. Bituminous coal is used for firing the kilns.

The manufacture of fire-brick has been one of the characteristic industries of Maryland for fifty years, and the brick made from the carboniferous fire-clays of Alleghany county, in the western part of the State, still rank as the best in this country. The oldest fire-brick concern in Allegany county, that at Mount Savage, was organized in 1841, and was the first of its kind in the United States. Originally the works at this point embraced two blast furnaces and a rolling-mill, the immediate vicinity furnishing all the requisite raw material for these industries; but the furnaces and mill were abandoned years ago, while the manufacture of fire-brick has developed into a large industry. The town of Mount Savage lies nine miles west of Cumberland, at the foot of Savage Mountain, which is owned by the Union Mining Company, the principal fire-brick manufacturers in this locality. The bed of fire-clay lies at the bottom of the coal measures of this basin. Above the clay lies an eight-inch bed of coal, beneath is a bed of shale, three to four inches in thickness, underneath which comes the conglomerate rock marking the boundary of this basin. The clay bed ranges from eight to twenty feet in thickness, and is divided into two varieties designated as the hard and soft. The hard clay is of a gray color, shading almost to black; it is non-plastic unless ground to an impalpable powder, and disintegrates but little under exposure to the weather. The soft clay is very plastic, much lighter in color, and crumbles rapidly under atmospheric influence. A peculiar feature of this deposit is the intimate intermixture of the two varieties of clay in the same bed.

The composition of the Mount Savage clay shows considerable variation, the following analysis from the Massachusetts Institute of Technology being fairly representative:

| | |
|---|---|
| Silica | 50.457 |
| Alumina | 35.904 |
| Protoxide of Iron | 1.504 |
| Lime | .133 |
| Magnesia | .018 |
| Potash | Trace. |
| Water and Organic Matter | 12.774 |

An average of several analyses by different chemists shows the following result:

| | |
|---|---|
| Silica | 55.75 |
| Alumina | 33.23 |
| Impurities | 2.06 |
| Water | 10.37 |

The impurities in this clay are fewer and smaller in amount than in most other fire-clays. Nodules of iron ore occasionally appear in the bottom of the bed, but they are easily detected and removed. The two most valuable characteristics of the Mount Savage clay are its freedom from potash, which is one of the most objectionable constituents in fire-clay, and the large proportion of silica to alumina, which causes the brick to swell slightly, instead of shrinking, during hard burning.

The mines from which the clay is taken are high up on the side of Savage Mountain, about three and a quarter miles from the factory, with which they are connected by an inclined plane a mile and a quarter long and by a tram road. The output averages 5,000 tons of clay per month, and a stock of 30,000 to 40,000 tons is kept weathering in the yards at the works. The brick plant embraces two complete factories and two gas-fired kilns, each of a capacity of 500,000 bricks. The bricks are all made by hand, and include every shape and size that is required. Bricks made from the fire-clays of this region are used very largely for blast furnace, hot-blast stove linings, and other uses in iron works. In addition to the extensive works at Mount Savage there are several other fire-brick plants in Allegany county, at Ellerslie, Frostburg and elsewhere, which depend upon the same seam of clay. In the eastern part of the State, in Baltimore and vicinity and at North East, Cecil county, there are several fire-brick factories. The source of the materials used is largely local, although the Mount Savage and other clays are also employed. The total amount of production of these factories amounts to about $100,000 annually. The same works produce in considerable amounts clay retorts, blocks and tiles, stove linings, chimney tops, drain pipe and fire cement. The largest producers of fire-bricks is the Baltimore Retort and Fire-Brick Company, with an annual output of 800,000.

The clay beds of Baltimore and vicinity furnish a portion of the raw material for the manufacture of pottery, which has assumed considerable proportions in that city. While the local beds yield clay of sufficient fineness and freedom from iron ore to make it suitable for coarser grades of pottery, more distant sources of supply are drawn upon to furnish material for the finer grades of wares that are manufactured in Baltimore. The three substances used in porcelain manufacture are flint (vein quartz), feldspar and fine clay. Flint is obtained from Harford, Carroll and Howard counties, soda feldspar from Cecil county and potash feldspar

from Delaware county, Pa. For the finer grades of ware, imported china clays are used. The oldest of the Baltimore potteries has been in operation for nearly fifty years. There are now five concerns engaged in the manufacture of various grades of pottery, employing about 1,000 hands and yielding an annual product valued at about $1,000,000. The wares manufactured cover a wide range from heavy plumbers' goods to the finer grades of toilet and table ware. The industry is developing rapidly, and it promises to give Baltimore a world-wide reputation as a pottery manufacturing centre. Among the more important pottery factories are the Chesapeake Potttery, operated by Haynes, Bennett & Co., and the Edwin Bennett Pottery. The finer products of these establishments have attained a high reputation.

### MINOR MINERAL PRODUCTS.

There are several other mineral substances of more or less economic value which are either at present obtained in Maryland, or which have been previously worked here with varying results, according to the demand. None of these ever have, or probably ever will give rise to mineral industries of great magnitude, a fact which is in some cases due to the insufficient supply of material, while in other cases it is due to the very limited use of the substances in question.

*Porcelain Materials.* Three prime requisites in the manufacture of porcelain are flint (vein quartz), feldspar, and china clay (kaolin). All these substances are found in Maryland, and they are all, but especially the first, obtained and shipped to the potteries of Trenton, N. J., and Baltimore. Large amounts of a pure granular or vitreous quartz occur as vein-filling through all the rocks of the highly crystalline belt in Maryland. It is especially abundant in Cecil, Harford, Baltimore, Carroll, Howard and Montgomery counties. At particular localities where the conditions are most favorable, this quartz is quarried and finely ground in mills constructed for the purpose. It is bolted as fine as flour and then shipped in sacks to the potters. This flint industry is most active in Harford county. The largest deposit is near Castleton, near the Susquehanna River, where a vein of pure quartz occurs wide enough to permit three parallel drifts being made into it, and where the supply seems to be large enough to meet all requirements. Other flint quarries and flint mills are situated near Deer Creek, in the same county, and another large one was actively worked a short time since about two and a-half miles north of Marriottsville, in Carroll county. According to the returns of the tenth U. S. census, Maryland was, in 1880, the foremost producer of flint among the States of the Union. Her product was in that year, 4,026 tons from five quarries in two counties, valued at $30,109. In 1889 her product was 8,632 tons, valued at $46,828.

The best feldspar and kaolin produced in the United States for porcelain is obtained within a radius of fifteen miles from the common corner of Pennsylvania, Delaware and Maryland. A good soda-feldspar occurs near Rising Sun, in Cecil county, Maryland. Silas J. Lane reports a good feldspar quarry at Rock Springs, Cecil county, from which in 1892 he took 500 tons, valued at $3.00 per ton. Kaolin also occurs on the same farm, but these substances seem at present not to be so extensively produced as in Delaware county, Pa., and in Delaware. During 1880 Cecil county produced 250 tons of kaolin, valued at $1,750.

A considerable quantity of glass-sand has been produced in Anne Arundel county (tenth census says 17,125 tons in 1880, worth $34,250), and the same substance is now obtained by pulverizing the white Medina sandstone near Cumberland.

*Ochre or Mineral Paint.* Mineral paint has from time to time been produced to a considerable extent from the brown iron ore deposits of Maryland. The most important producer has been the Catoctin iron mine, south of Mechanicstown, in Frederick county. This mine is reported to have yielded as much as 7,000 tons of ochre in one year, though this is probably a mistake. It is at present entirely inactive. Messrs. J. T. Whitehurst & Co., of Baltimore, have for three years been operating ochre mines in Carroll and Howard counties, in which they employ an average of thirty men.

*Asbestos.* Within the most crystalline rocks of Maryland several deposits of asbestos occur, most of which, however, is not true asbestos, although it passes under that name, but the fibrous variety of serpentine known as chrysotile. These deposits are, in both quality and quantity of the product, inferior and unimportant. In 1880 one mine in Harford county and three mines in Baltimore county produced a total of forty tons, valued at $1,000; but the discovery of extensive deposits in other regions has now entirely stopped any operations for this mineral in Maryland.

*Lead and Zinc.* Small traces of galena and zinc blende were early noticed near the quarries on Jones's Falls, in Baltimore. Much more decided indications of these metals occur in connection with the crystalline limestone belts in the western part of Carroll and eastern part of Frederick counties. Tyson, in his second annual report as State Agricultural Chemist in 1862, mentions argentiferous galena as having been discovered near Unionville, and at the Dollyhide copper mine, near Liberty, both in Frederick county. In 1881 Prof. Persifor Frazer, in a report on some copper deposits in limestone one and one-half miles south of New Windsor, in Carroll connty, mentions galena, zinc blende and manganese oxide as also occurring in the openings made for copper.*

* Trans. Am. Inst. Min. Eng. Vol. IX, p. 33, 1881.

The writer has also observed frequent traces of lead and zinc in the limestone quarried near Linwood, a short distance further west. In 1890 a deposit of galena long known to exist in the limestone on the farm of Miss Elizabeth Cox, some three miles southwest of Union Bridge, was opened at three places, and called the Mountain View Lead Mine. Operations on a small scale were carried on here for some time, but were subsequently discontinued. Tyson mentions (1862) the fact that oxide of zinc constantly accumulated in the upper part of the Catoctin furnaces, indicating the presence of this element either in the iron-ores or limestone used as a flux. This is interesting in connection with the recent discovery of franklinite associated with the specular iron-ore near Catoctin. In spite, however, of the frequent traces of lead and zinc through central Maryland, it may be confidently asserted that neither of these metals occurs in any amounts that will ever repay mining. This will be realized when it is considered with what extensive and rich deposits in the west any product must be brought into competition.

*Manganese, Antimony, Molybdenum.* Although traces of these metals also have been detected in Maryland, they are even more insignificant than those of lead and zinc. Manganese was once mined a short distance west of Brookville, in Montgomery county, but the deposit was not sufficiently extensive to be profitable. Frazer also mentions the same substance as occurring with copper, near New Windsor. Specimens of the pure sulphide of antimony have been obtained in the Middletown valley, but nothing is known of its occurrence or extent. The earliest record of molybdenite (sulphide of molybdenum), found on this continent was made in 1811, at the Jones's Fall Gneiss Quarries.

*Mica and Graphite.* In the coarse-grained granite dykes which abound in many parts of the eastern Piedmont region, good-sized plates of light-colored mica (muscovite) occur. Attempts have been made to secure commercially valuable amounts of this in both Harford and Howard counties, but they have not been successful. No outcrops have as yet been noticed in Maryland which promise to compete with the mica mines of North Carolina.

Traces of graphite have been found near Pylesville, in Harford county, at the edge of the Peach Bottom slate belt. Similar deposits occur further northward, in Pennsylvania, where they have been mined to some extent.

*Diatomaceous Earth* (*Infusorial Earth*). Diatomaceous earth, known to the trade as infusorial earth, has been produced in larger quantities in Maryland than elsewhere in the United States. In 1889, according to the Eleventh Census Report upon Mineral Industries, Maryland produced 3,040 tons out of the 3,466 tons worked that year. Of this amount 3,000 tons came from the Dunkirk district of the Patuxent

region, in Calvert county, and 50 tons from Pope's Creek, in Charles county. The value of the product was estimated at $10,700.

The first diggings were opened on the Patuxent River in 1882. The material was first brought to Baltimore, where it was separated by a process of washing into different grades of polishing powder. Upon further investigation it was found to make an excellent non-conducting cover for steam pipes. It was, however, difficult to introduce the material into the market, and in 1884 the works passed into the hands of a New York company. In 1887 an excellent deposit was opened at Pope's Creek, and a considerable quantity was taken out prior to 1889. Since that time neither of the localities has been extensively worked.

The deposit of diatomaceous earth is found near the base of the Miocene and extends across the State from northeast to southwest. It is best exposed at Herring Bay, on the Patuxent River, and at Pope's Creek. It frequently reaches 30 feet in thickness and is of unknown extent.

An analysis of a specimen from Pope's Creek, made by P. de P. Rickets, of New York, is a follows:

| | |
|---|---|
| Silica | 81.53 |
| Alumina | 3.43 |
| Protoxide of iron | 3.33 |
| Lime | 2.61 |
| Magnesia, soda potash, sulphur and organic matter | 5.63 |
| Moisture | 3.47 |
| | 100.00 |

*Sand.* There is little statistical information to be obtained as to the economic importance of the sand deposits of the State. Beds of sand of greater or less volume are found in all the formations of the Coastal Plain, and are employed locally for building purposes. In recent years the sandy sediment on the bed of the Potomac has been dredged and used extensively in Washington.

At the head of the Severn River, in Anne Arundel county, extensive diggings have been opened in the Lower Cretaceous, and a very pure grade of glass sand taken out. It is transported on small schooners, which are able at high tide to reach the head of the river.

In 1880 the tenth census report gives the output at 17,125 tons, valued at $34,250.

At Cumberland the Medina sandstone, which occurs in the vicinity, is ground up and employed for glass-making, the largest glass works in the State being situated there.

*Marl.* The Eocene and Miocene formations of Maryland are rich in marl deposits. Those of the Eocene are green-sands not unlike the famous green-sand marls of New Jersey, which have been so extensively employed as fertilizers in the eastern and southern portions of that State. The

best Eocene marls in Maryland are found in Prince George's and Charles counties. The Miocene marls are also very abundant in the more southern and eastern portions of the State. An examination of the geological map will show the area of their distribution. In the volume upon the Mineral Resources of the United States for 1888 the following statement is made in regard to their uses: "Especially adapted to grasses and cereals, and used to some extent on tubers." A popular way of using it is in the form of a compost with barn-yard manure.

The proportions of compost are variable, but generally one-third, by bulk, of marl to two-thirds manure. From 10 to 20 tons, and in some cases more, are used per acre. The method of application varies with the crop for which it is used; with some it is broadcast, with others drilled in, and, with tubers, it is placed in the hill.

The total product of marl in the United States from New Jersey, Virginia, North Carolina, Alabama and Arkansas in 1890 was 153,670 tons, valued at $69,880, of which the greater proportion was from New Jersey.

Very little utilization of the marl has been thus far made in Maryland. It could be employed by the farmers of the eastern and southern counties to good advantage.

## MINERAL WATERS.

Although the mineral waters of Maryland have not in the past attracted attention, there are several kinds which are being placed at the present time, with greater or less success, upon the markets, and two, at least, which are being exported in considerable quantities. Several of the waters are represented as having valuable medicinal properties, while others are sold simply as table waters, chiefly in Baltimore city. Most of the mineral waters come from the crystalline rocks of the Piedmont Plateau, only a few having been reported up to the present time from the Appalachian region and the Coastal Plain.

According to the eleventh census report, based upon information obtained in 1890, Maryland ranks thirteenth among the States in the number of springs reported, and twenty-first in the volume of production. The amount utilized in that year from the Maryland springs is stated to be 74,160 gallons, of a market value of $12,057. Since 1890 the waters from several new springs have come into the market, so that the importance of Maryland in the production of mineral waters has been very much increased.

*Mineral Waters of the Appalachian Region.* A thermal spring of saline mineral water is situated at Flintstone, Alleghany county, on the Old National Turnpike, twelve miles to the east of Cumberland. In the eleventh census report on Mineral Industries it is classed as calcic in the

group of sulphated waters under saline springs. It is stated to have 174 grains of mineral matter to the gallon. Only small quantities of the water have reached the market up to the present time, but attempts are being made to bring it to the notice of the public.

There are numerous cold chalybeate springs scattered throughout Western Maryland, but there has been as yet very little attempt to introduce the waters or to develop the properties upon which they are situated.

*Mineral Waters of the Piedmont Plateau.* Among the several springs situated in the Piedmont Plateau which produce marketable waters, some have a small percentage of mineral matter in solution, and are advertised mainly as pure table waters, while in the case of others the proportion of mineral matter is larger, and various medicinal uses are claimed for them.

Among the various springs are the following:

The *Chattolanee* Spring is situated in Green Spring Valley, in Baltimore county. The water has been employed in Baltimore to some extent for table uses.

*Analysis of the Water.*

| | Grains per gallon. |
|---|---|
| Sodium Chloride | 0.2232 |
| Potassium Sulphate | 0.1908 |
| Calcium Sulphate | 0.0043 |
| Sodium Carbonate | 0.0773 |
| Calcium Carbonate | 3.5522 |
| Magnesium Carbonate | 1.2665 |
| Oxide of Iron and Alumina | 0.0466 |
| Silica | 0.5424 |
| | 5.9033 |
| Organic and Volatile Matter | 0.7291 |
| Total | 6.6324 |

The *Roland* Spring is situated on Roland avenue, just north of the city of Baltimore. The water has only recently been put upon the market, but is already sold to a considerable extent.

*Analysis of the Water.*

| | Grains per gallon. |
|---|---|
| Solids, volatile | 2. |
| Solids, mineral | 6.50 |
| Total | 8.50 |

The *Strontia* Spring is situated in the Green Spring valley, in Baltimore county. The water is sold somewhat widely outside the limits of the State.

*Analysis of the Water.*

| | In 100,000 parts. |
|---|---|
| Nitrate of Potassium | 4.66 |
| Nitrate of Sodium | 1.43 |
| Chloride of Sodium | 12.87 |
| Chloride of Magnesium | 6.72 |
| Chloride of Calcium | 35.46 |
| Bicarbonate of Calcium | 6.75 |
| Sulphate of Strontium | 0.22 |
| Bicarbonate of Strontium | 1.86 |
| Bicarbonate of Iron | 0.88 |
| Alumina | 1.86 |
| Silicic Acid | 2.05 |
| Phosphoric Acid, Iodine, Ammonia and Organic Matter | Traces |
| | 74.76 |

In addition to the solid substances in solution, carbonic acid, oxygen and nitrogen occur.

The *Lystra* Spring is situated in the Green Spring valley, Baltimore county. For this water also there is a considerable demand.

*Analysis of the Water.*

| | Grains Per Gallon. |
|---|---|
| Bicarbonate of Magnesia | 18.468 |
| Bicarbonate of Lime | 14.951 |
| Bicarbonate of Iron | 1.111 |
| Sulphate of Lime | 5.400 |
| Sulphate of Soda | 1.377 |
| Sulphate of Potash | .501 |
| Chloride of Sodium | .588 |
| Alumina | 2.700 |
| Silicic Acid | 1.000 |
| Phosphoric Acid and Lithia. | Traces |
| | 46.096 |

In addition to the solid substances in solution, carbonic acid, oxygen and nitrogen occur.

The *Bentley* Springs are situated in northern Baltimore county.

*Analysis of the Water.*

| | Grains Per Gallon. |
|---|---|
| Carbonate of Lime | .640 |
| Carbonate of Magnesia | .680 |
| Carbonate of Soda | .461 |
| Carbonate of Iron | .890 |
| Chloride of Sodium | .270 |
| Sulphate of Lime | .345 |
| Silicic Acid | .435 |
| Alumina and Loss | .025 |
| | 3.750 |
| Organic Matter | .910 |
| Total | 4.660 |

| | Grains Per Gallon. |
|---|---|
| Carbonate of Lime | .3380 |
| Carbonate of Soda | .3700 |
| Carbonate of Magnesia | .2650 |
| Sulphate of Lime | .3040 |
| Chloride of Sodium | .1910 |
| Silicic Acid | .3280 |
| Iron, Alumina and Loss | .0200 |
| | 1.8160 |
| Organic Matter | .3690 |
| Total | 2.1850 |

There are several other mineral springs in the Piedmont region, around which summer resorts have sprung up. At Glencoe, Baltimore county, is a spring of considerable volume, with water similar to that of the Chattolanee Spring. At Cowentown, Cecil county, near the border of the Coastal Plain, a spring of mineral water is recorded in the Eleventh Census Report. A sulphur spring is also found in Carroll county, near Westminster. Many other mineral springs are found scattered over the Piedmont region, but little beyond local use has been made of them up to the present time.

*Mineral Waters of the Coastal Plain.* Very few springs of mineral water, of more that local reputation, are reported from the Coastal Plain.

Barron Creek Springs, in Wicomico county, was at one time a resort of some note, but is now quite abandoned.

A flowing artesian well, at Cambridge, Dorchester county, furnishes a mineral water, which is much used by the citizens, and is somewhat widely known.

Several other springs, which have only a local value, are reported from the eastern and southern counties. Among them is a sulphur spring situated at St. Michael's, Talbot county.

# CHAPTER V.

## AGRICULTURE AND LIVE STOCK.

### AGRICULTURE.

The history of the development of agriculture in these older States, for at least two hundred years after their colonization, is intimately connected with the development of the social and political life and with the industrial and commercial prosperity, elsewhere treated in this volume. Grass, wheat, tobacco and corn have been, from the first, staple crops.

The development of agriculture in Maryland, during the present century and until about fifteen or twenty years ago, does not differ essentially from that of other neighboring States, but within this latter period the agricultural lines have been changing for causes and in such directions as will be developed in the course of this chapter.

There has been a very general and widespread depression in agriculture, which reached its greatest extent about ten or fifteen years ago. The prices of the old staple crops fell below the actual cost of production, at least in the poorer agricultural regions of the State, and yet these crops continued to be everywhere grown, partly from force of habit and tradition, and partly because it was not known what other crops could take their place. Already the beneficial effect of this great depression is being felt, and there are signs that the State is entering upon an era of unexampled agricultural prosperity.

It will be well, therefore, to consider carefully the principal causes which led to this general depression, which has really proved a stimulus to better, more healthy and more stable conditions, and to sketch briefly the present condition of agriculture in the State and the direction it seems to be taking.

### RETROSPECT.

The depression spoken of has been largely due to the wonderful revolution and advance which has completely changed the social and commercial conditions of the world. Agriculture, with its long seasons and slow methods, has not yet adapted itself to these changed conditions. Before the introduction of cheap and rapid transportation by means

of steam cars and steamships, manufacturing industries were distributed in small shops throughout the rural communities, and the larger cities, forming both the trade and industrial centres, grew up along the coast or on the water courses, where the free access to the ocean offered an easy and a cheap means of bringing in food for the workers and of disposing of the manufactured goods. The city dwellers had to depend for their staple products upon what could be raised within a few days' hauling distance of the town; while the producers within this surrounding area had to supply all the staple articles of food, and were sure to find a ready market for their products, as there was little competition from abroad. If these conditions had continued, Baltimore could never have grown to its present size, and there are a dozen towns and cities in this State which might have rivaled Baltimore except for the double advantage she has always had of water-power for manufacturing purposes, and of free communication by water with other countries and with a large portion of the State through the numerous water-ways leading out from the bay.

With the introduction of steam, however, these conditions have been entirely changed, and these limiting causes have been largely overcome. The city is no longer dependent for its food supply upon what can be raised in its immediate vicinity, nor is a country entirely dependent upon what can be raised within its own borders. Large areas have been opened up for the production of staple crops, and the amount annually produced has been enormously increased. Wheat can be raised and transported from the far West, and rice from the far East, cheaper than they can be produced here at home. Before the war both rice and cotton were grown in this State, to a limited extent, for home consumption, but it would scarcely pay to raise the former now, and it would certainly not pay to raise the latter. The prices of all our old staple crops have fallen below what many estimate to be the actual cost of production in many parts of the State where the soils are light and the yield per acre is low.

This revolution has similarly affected all industries. The small manufacturers in the rural towns have found that their goods could be more cheaply manufactured by the larger concerns in the city, and they have been driven to the wall or have merged into the larger concerns. It seems hard and discouraging to the small manufacturers, but the country, as a whole, has never known such industrial prosperity as at present. Formerly one manufacturer might put out a variety of products; now there are great manufactories where nails and spikes alone are produced, others where railroad iron is turned out, others where boiler plates are rolled, others where engines are constructed, and others again where iron battle-ships are put together. No one manufacturer

attempts now, as formerly, to meet all the demands of industrial life, but makes a specialty of one narrow line which the state of the market, his surroundings, or his natural inclinations lead him into.

There is need of the same business methods and the same business enterprise in agriculture as in the industrial arts, and our farmers are gradually learning this. They see that they cannot be guided so much by what their fathers did in the past as by what they see is needful for the present and for the prospective state of the market. We can no longer afford to grow the same variety of crops in all parts of the State. There are a great variety of soils in the State, and these different soils are best adapted to different crops and to different agricultural productions. The adaptation of these soils to crop production must be well understood; the state and demands of the market must be carefully studied, considering at all times the possibility of being able to create new or larger demands; the peculiar locality and surroundings must be considered, such as nearness of the market and the ease and cost of transportation. The chief energies of the farm must be given to the one line suggested by the adaptation of the soil, the state of the market and the personal bent of the producer, whether it be the production of staple crops, of fruit, of truck, of stock, or the dairy interests. Wheat used to be raised on nearly all farms as a matter of course, whether it yielded ten bushels per acre or forty. Lands which produce less than fifteen bushels of wheat per acre are not now considered productive, and they cannot compete with the grain-producing area of the West. These light lands, which formerly were considered nearly worthless for agricultural purposes, have now the highest market value for the production of early truck and of fruit, and the acreage of wheat, corn and tobacco has very greatly diminished in the past ten years.

Agriculture is very slow and its methods must needs be conservative. It takes about a year for the results of an experiment or the change of a method to be known, and much longer than this for any change or improvement, based on this experiment or on the changing conditions of the market, to be generally felt. With its slow methods it is usually about twenty-five years behind any marked industrial advance, and it is only now adjusting itself to the remarkable advances of recent years.

Together with the decline in market value of the staple crops, and partly as a result of this and partly as a result of the late war, there has been a decline in the value of agricultural lands. In Southern Maryland, and on the Eastern Shore particularly, many of the planters suffered serious losses, as in all the Southern States, as a result of the late war, and many farms bear heavy mortgages. Farmers who purchased land only a few years ago when crop prices were higher, and gave mortgages for part of the purchase money, with every reason to suppose that they

would be able to pay them off, have, with the unexpected decline in market values, been unable to bear this burden and meet their current expenses, and the mortgages have been increased from time to time, until the property has been thrown on the market. Many large and once valuable estates have thus run down and been abandoned, and fine lands, adapted to varied agriculture, can be purchased for a fifth or even a tenth part of their value twenty years ago. While these conditions are undoubtedly discouraging to many of the present owners of lands in the State, they offer great advantages to any one having an unincumbered property with even a small working capital, who understands the adaptation of the soil, and who has sufficient business habits and methods to watch and take advantage of the market.

There are two principal factors in addition to personal inclinations which should determine what particular agricultural line should be taken up. These are the adaptation of the land, and the state and nearness of the market, with the ease and cost of transportation. For stock raising, obviously a locality must be selected where the soil is sufficiently strong to grow grass for hay and to maintain good pasturage. The milk trade which supplies the Baltimore market cannot well be located at any considerable distance from the city, and it must be in those directions where the land is sufficiently strong to produce pasturage or other forage for the stock, and near a line of railroad. These conditions at once prevent a large portion of the State from competing in this milk trade. Much the same may be said of the market gardens, which must be near the city so that the young and tender vegetables may be hauled to market by the producer's teams. Truck farming has a much wider area, but this is limited, as we shall see, to those light sandy soils which force the crop to an early maturity and so get the advantage of the early market prices. Wheat must be confined to those lands which produce from eighteen to forty bushels per acre, and tobacco to such lands as will give the color and texture required by the present market demands.

## THE AGRICULTURAL REGIONS OF THE STATE.

The State may be divided into four principal agricultural regions, each having peculiar advantages of soil, climatic conditions, nearness of the market and means of transportation. For convenience in treatment, however, two of these can be classed together.

*Western Maryland* comprises that part of the State west of the Catoctin Mountains, including Garrett, Alleghany and Washington counties and part of Frederick county. This region is quite mountainous, and much of the land is in native forest growth. Some of the finest and most fertile grass and wheat lands, however, are in this region.

The Trenton limestone, the Helderberg limestone and the Catskill red sandstone are valued in the order given, the Trenton limestone lands being the heaviest and the finest in the State. The Cambrian sandstone along the northern slopes of the North Mountain has recently become famous for the quality and color of the peaches, and peach growing has become a very large and important industry over this limited area, where there is the proper exposure to insure the crop against danger of frost. The "mountain peaches" come into the market later than the crop from the southern and eastern section of the State, and bring an excellent price. There are probably other localities and other formations further west which are as well adapted to peaches; and this industry will undoubtedly spread.

The mountains and the very rolling lands are, for the most part, covered with a native growth of forest trees, and with a native pasturage which adapts it to grazing purposes. The valley lands are usually very fertile and adapted to the finer kinds of grasses and to wheat and corn. There are excellent railroad facilities, and, what is equally important, there are good roads, or material within reach to make good roads. The soils will be described in detail in another section of this chapter. The fattening of cattle for market is an important industry in this region, and has assumed large proportions in Washington county.

*Northern Central Maryland* consists of Cecil, Harford, Baltimore, Carroll, Howard and Montgomery counties and part of Frederick county. It is located mainly within the Piedmont Plateau, or the area of the crystalline and semi-crystalline rocks. It has much the same agricultural features as the valley lands of Western Maryland. The country is gently undulating, giving admirable surface drainage to the lands. The variety of rocks gives a great variety of soil formations in this region, but a number of them have very nearly the same agricultural value, and the region, as a whole, is remarkably uniform. The soils, as a rule, are strong and fertile; they have good body and good surface and under-drainage, and are capable of a high state of cultivation. They are well adapted to grass, wheat and corn, and these have long been the staple crops. The lands are admirably suited to stock raising and the fattening of cattle, and large numbers are annually fattened for market. Where the distance from the market and facilities for transportation admit, this locality is favorable to dairy farming, and the milk trade of Baltimore is entirely within this area. These same remarks may apply to market gardening as distinguished from truck farming. In recent years corn and tomatoes have been raised in large quantities for canning, and especially in Harford county. A number of lines of railroad cross the area, the facilities for transportation are excellent, and the roads are equally good.

*Southern Maryland* includes Anne Arundel, Calvert, St. Mary's, Charles and Prince George's counties. It occupies a peninsula formed by the Chesapeake Bay and the Potomac River. The country is gently undulating, and has good surface and under drainage. There are good wheat and grass lands in this part of the State, principally formed from the diatomaceous earth in the Chesapeake formation. Many of these, which were formerly good wheat lands, are run down from causes already mentioned. Much of the land is heavily mortgaged, there is a lack of working capital, farm labor is scarce and inefficient, wages are high, and it takes two or three times as much land to produce a bushel of wheat as on the heavier limestone soils of Western Maryland.

Most of the land in Southern Maryland is far too light in texture for grass and wheat, but it is admirably adapted to truck farming and to fruits of different kinds, especially to peaches and strawberries. Truck and fruit raising is already a very important industry and one growing in importance, as the market demands are being increased and enlarged and transportation facilities extended.

Tobacco has been a staple crop in Southern Maryland since the earliest colonial days. The best quality of tobacco, which will be described in another place, is raised on the lighter wheat lands, which are heavier than the earliest truck soils. The quality of the tobacco has deteriorated in recent years. Labor is scarce and less care is taken than formerly in the cultivation and preparation of the crop for market. The area of tobacco culture in the United States and abroad has been enormously increased, so that this grade of tobacco meets with wide competition, and the market demands themselves have changed, so that the industry is not what it formerly was. Efforts are being made to introduce other varieties of tobacco which will meet higher market demands, and if these efforts be successful a stimulus will be given to tobacco culture in districts where all the conditions are adapted to producing a mild, fine-textured and light-colored leaf.

This region will undoubtedly, within a short time, be almost entirely devoted to tobacco, fruit and truck farming, for the soils are well suited to these crops and there can be no competition in any part of the State except portions of the Eastern Shore. The lack of railroad facilities has prevented this region from developing as it will as soon as they are provided. There are two or three lines of railroad within this area, and several more are contemplated or in actual process of construction. Numerous rivers and creeks make up into the land, providing cheap and easy communication with Baltimore by water, and in some of the lower counties there is no place over five miles from a good steamboat landing.

*The Eastern Shore* includes all that portion of the State east of the Chesapeake Bay except Cecil county, which is included, agriculturally, in Northern Central Maryland. It comprises Kent, Queen Anne, Talbot, Dorchester, Caroline, Wicomico, Somerset and Worcester counties. The country, as a rule, is very level and flat, the elevations rarely exceeding fifty feet. There are heavy soils in this locality admirably adapted to wheat and corn, which have always been staple crops; there are other soils, lighter in texture, well suited to fruit, especially peaches, and other very light, sandy lands suitable for fruit and early truck. None of the other agricultural regions in the State have as fine facilities for transportation as this Eastern Shore. Several lines of railroad branch out through it in all directions, and there are so many rivers and creeks that cheap and easy water transportation is not more than a few miles distant from any locality. The roads are generally excellent, especially on the heavier wheat and corn lands. The climate is mild and temperate, as the ocean is on one side and the bay on the other. Living is cheap, as it is all along the south Atlantic coast where fish and oysters are abundant, and the winters are so mild that little provision has to be made for them. This region has been noted from the earliest colonial times for the hospitality of the people, and the social life of the Eastern Shore, cut off in a way from the rest of the State, has been unique.

## THE PRINCIPAL CROPS OF THE STATE.

Grass, wheat, corn and tobacco have always been the staple crops, and they will continue so to be in certain sections where the land is sufficiently strong and fertile to return large yields per acre, or where the soil is well adapted to produce the quality or texture of crop required by the present market demands.

In speaking of the causes of the recent depression in agriculture, it was stated that before the introduction of cheap and rapid means of transportation these staple crops were very generally grown on all farms, whether the yield was large or small. The custom of generations had developed a traditional routine which scarce any one departed from. There was a ready market in the cities and no one dreamed of competition from the far West. Land which would produce a yield of only 10 bushels per acre of wheat was considered poor, and the management was referred to as poor farming. It was supposed that the same methods of cultivation under which yields of 20, 30 or 40 bushels per acre of wheat were produced in other portions of the State, or in England, should give the same results on these light lands. There was no consideration of the difference in climatic conditions nor of the important effect of the physical texture and structure and the adaptation of the soils. No wonder farmers were discouraged when the same treatment under which

forty bushels of wheat per acre were produced on the limestone soils, failed completely, on these lighter sandy lands, to produce any material increase.

One of the most encouraging signs in regard to the development of agriculture in this State at the present time is that farmers are leaving this beaten track, and are giving up the cultivation of these staple crops for others which they find they can produce as well, or better, than they can be produced elsewhere, and they are even creating market demands for products which were formerly not cared for or considered as luxuries.

The returns for the 11th Census show that there has been a very marked falling off in the acreage of wheat, corn and tobacco in the past decade, and this is a very encouraging sign, accompanied as it is by a very remarkable increase in the value of truck produced.

The following table gives a summary of the cereal productions in Maryland:

## SUMMARY OF CEREAL PRODUCTION IN MARYLAND.

(Census Bulletin No. 303, issued November 8, 1892.)

| COUNTIES. | BARLEY. | | BUCKWHEAT. | | INDIAN CORN. | | OATS. | | RYE. | | WHEAT. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acres. | Bushels. | Acres. | Bushels. | Acres. | Bushels. | Acres. | Bushels. | Acres. | Bushels. | Acres. | Bushels. |
| Total | 818 | 18,778 | 7,569 | 96,747 | 568,817 | 14,928,142 | 99,195 | 2,019,658 | 34,302 | 352,596 | 510,727 | 8,348,177 |
| Alleghany | 2 | 9 | 512 | 3,811 | 6,513 | 132,750 | 3 900 | 71,769 | 1,573 | 14,813 | 5,086 | 60,111 |
| Anne Arundel | 2 | 20 | 1 | 25 | 24,561 | 510,088 | 2,097 | 30,106 | 239 | 1,736 | 6,237 | 68,204 |
| Baltimore | 34 | 768 | 365 | 3,190 | 33,825 | 1,262,435 | 13,401 | 292,540 | 6,863 | 75,936 | 26,369 | 458,828 |
| Calvert | ........ | ........ | 103 | 1,655 | 7,830 | 142,835 | 1,251 | 11,452 | 77 | 428 | 3,527 | 24,744 |
| Caroline | ........ | ........ | 96 | 703 | 21,364 | 373,055 | 740 | 8,698 | 295 | 2,001 | 19,617 | 289,437 |
| Carroll | 375 | 9,987 | 245 | 2,086 | 33,624 | 1,260,825 | 10,695 | 273,481 | 6,752 | 82,613 | 44,704 | 795,146 |
| Cecil | ........ | ........ | 21 | 265 | 23,905 | 831,298 | 8,687 | 232,484 | 60 | 966 | 28,312 | 542,383 |
| Charles | ........ | ........ | ........ | ........ | 19,900 | 280,974 | 1,864 | 19,280 | 415 | 2,639 | 8,579 | 82,597 |
| Dorchester | 2 | 60 | 12 | 200 | 27,551 | 367,931 | 877 | 9,660 | 135 | 908 | 16,952 | 210,132 |
| Frederick | 251 | 5,439 | 81 | 514 | 51,782 | 1,990,489 | 7,502 | 184,873 | 6,474 | 59,193 | 76,429 | 1,227,424 |
| Garrett | 6 | 140 | 5,466 | 77,781 | 3,290 | 93,294 | 10,999 | 230,414 | 930 | 8,139 | 2,562 | 30,427 |
| Harford | ........ | ........ | 292 | 3,252 | 23,890 | 907,690 | 11,105 | 270,434 | 208 | 2,032 | 20,071 | 363,298 |
| Howard | 21 | 320 | 89 | 1,018 | 18,377 | 628,550 | 3,604 | 66,250 | 1,979 | 22,222 | 17,628 | 301,046 |
| Kent | ........ | ........ | 11 | 160 | 27,731 | 788,958 | 1,205 | 18,257 | 45 | 347 | 33 754 | 582,424 |
| Montgomery | 1 | 10 | 118 | 1,040 | 32,840 | 1,194,542 | 2,641 | 50,681 | 4,781 | 45,051 | 30,237 | 480,240 |
| Prince George | ........ | ........ | 12 | 179 | 23,836 | 590,660 | 2,919 | 40,527 | 1,575 | 12,222 | 8,250 | 74,229 |
| Queen Anne | ........ | ........ | 10 | 51 | 34,639 | 729,725 | 715 | 9,138 | 153 | 1,308 | 49,313 | 835,478 |
| St. Mary | 10 | 100 | 7 | 25 | 20,630 | 318,458 | 1,535 | 14,118 | 171 | 1,088 | 12,444 | 133,696 |
| Somerset | 7 | 100 | 1 | 10 | 19,106 | 255,340 | 3,149 | 39,191 | 38 | 346 | 6,050 | 89,411 |
| Talbot | 25 | 200 | ........ | ........ | 20,133 | 547,819 | 244 | 4,556 | 15 | 112 | 33 289 | 663,671 |
| Washington | 78 | 1,569 | 82 | 582 | 32,832 | 986,767 | 2,651 | 66,572 | 1,429 | 17,926 | 55,648 | 978,515 |
| Wicomico | 1 | 5 | 45 | 200 | 36,452 | 284,735 | 1,074 | 11,601 | 68 | 371 | 2,008 | 20,565 |
| Worcester | 3 | 60 | ........ | ........ | 42,204 | 448,924 | 6,340 | 63,576 | 27 | 199 | 3,661 | 36,173 |

In commenting on these results in the Census Bulletin it is stated that "in Maryland the total area in cereals in 1889 was 1,239,428 acres, as compared with 1,378,276 acres in 1879, a decrease of 138,848 acres, or 10.07 per cent. There was a decrease of 78,111 acres in the area of corn, of 58,569 acres of that in wheat, of 2,725 acres in buckwheat, and of 1,932 acres in oats. On the other hand, there was an increase in the areas in rye and barley of 1,897 acres and 592 acres respectively." Properly to understand and appreciate the significance of this decrease in the area devoted to these staple crops, and the lesson it teaches of the direction agriculture is taking, it will be well to consider these results in some detail.

The following tables, compiled from these results and those of the 10th Census, give the acreage and average yield of wheat and corn per acre for the different counties in the State, arranged in the order of the yield per acre in 1879. It is hardly proper to compare the yields of but two years, as the difference in the season may be amply sufficient to produce marked differences in the yields per acre. There are, indeed, two factors which would tend to influence the yield per acre in these returns—the climatic conditions and the very marked decrease in the acreage. It will be seen that the decrease in acreage has been decided in those regions having the lighter soils, which are not well adapted to the production of wheat, and it is probable that in general the lands least adapted to wheat or corn are those where the cultivation of these crops has soonest been replaced by that of other crops better adapted to the lands. The result of this natural selection would be an apparent increase of the yield per acre. Due allowance must be made for the effect of the season or crop production.

The following table will give an idea of the climatic conditions for the two census years under consideration. The data covers all the crop season of the staple crops:

METEOROLOGICAL DATA FOR BALTIMORE, MARYLAND. (UNITED STATES WEATHER BUREAU.)

*Wheat Season.*

| | Temperature. | | | Rainfall. | | |
|---|---|---|---|---|---|---|
| | 1878-9. | 1888-9. | Difference | 1878-9. | 1888-9. | Difference |
| September | 69.4 | 64.0 | — 5.4 | 0.82 | 4.90 | + 4.08 |
| October | 58.3 | 51.4 | — 6.9 | 4.41 | 2.99 | — 1.42 |
| November | 46.9 | 46.8 | — 0.1 | 3.55 | 3.04 | — 0.51 |
| December | 35.3 | 35.9 | + 0.6 | 5.61 | 3.26 | — 2.35 |
| January | 31.3 | 37.6 | + 6.3 | 2.59 | 4.22 | + 1.63 |
| February | 32.1 | 29.4 | — 2.7 | 1.55 | 2.53 | + 0.98 |
| March | 43.7 | 42.8 | — 0.9 | 1.65 | 5.71 | + 4.06 |
| April | 52.7 | 54.0 | + 1.3 | 3.69 | 8.70 | + 5.01 |
| May | 65.7 | 65.0 | — 0.7 | 2.74 | 6.82 | + 4.08 |
| June | 73.3 | 70.7 | — 2.6 | 3.92 | 6.17 | + 2.25 |
| July | 78.8 | 75.7 | — 3.1 | 3.16 | 11.03 | + 7.87 |
| Total | ........ | ........ | ........ | 33.69 | 59.37 | +25.68 |
| Average | 53.4 | 52.1 | — 1.3 | 3.06 | 5.39 | + 2.33 |

| | 1878-9. | 1888-9. | Difference. |
|---|---|---|---|
| Clear days | 106 | 83 | — 23 |
| Cloudy days | 101 | 137 | + 36 |
| Rainy days | 106 | 158 | + 52 |

*Corn and Tobacco Season.*

| | Temperature. | | | Rainfall. | | |
|---|---|---|---|---|---|---|
| | 1879. | 1889. | Difference | 1879. | 1889. | Difference |
| April | 52.7 | 54.0 | + 1.3 | 3.69 | 8.70 | + 5.01 |
| May | 65.7 | 65.0 | — 0.7 | 2.74 | 6.82 | + 4.08 |
| June | 73.3 | 70.7 | — 2.6 | 3.92 | 6.17 | + 2.25 |
| July | 78.8 | 75.7 | — 3.1 | 3.16 | 11.03 | + 7.87 |
| August | 74.6 | 73.8 | — 0.8 | 6.71 | 1.40 | — 5.31 |
| September | 64.1 | 73.5 | + 9.4 | 2.72 | 4.59 | + 1.87 |
| Total | ........ | ........ | ........ | 22.94 | 38.71 | +15.77 |
| Average | 68 2 | 68.8 | 0.6 | 3.82 | 6.45 | + 2.63 |

| | 1879. | 1889. | Difference. |
|---|---|---|---|
| Clear days | 72 | 44 | — 28 |
| Cloudy days | 41 | 62 | + 21 |
| Rainy days | 53 | 90 | + 37 |

It will be seen that the mean temperature was considerably lower in the wheat season of 1888-9 than in that of 1878-9. There were over 25 inches, or 76 per cent. more rainfall in 1888-9, and 52 more rainy days, or 50 per cent. more than in the earlier period.

In the corn and tobacco seasons, from April to September, inclusive, the mean temperature was about the same in each season, but it was very differently distributed. There were nearly 16 inches, or 69 per cent. more rainfall in the season of 1889 than in that of 1879, and this rain fell on 37 more days, giving uniformly wetter conditions. The tobacco crop

of 1889 was exceptionally small, and of poor quality on account of this excessive rainfall.

These climatic conditions must be borne in mind in connection with the data which follows.

*Wheat.* The accompanying table gives the acreage and average yield of wheat per acre in each county in the State, compiled from the tenth and eleventh census:

ACREAGE AND AVERAGE YIELD OF WHEAT PER ACRE.
(Compiled from the Tenth and Eleventh Census.)

| | 1879. Acres. | 1889. Acres. | Per Cent. Difference 1889. | 1879. Bushels. | 1889. Bushels. | Difference Bushels. |
|---|---|---|---|---|---|---|
| State | 569,296 | 510,727 | — 10.3 | 14.06 | 16.35 | + 2.29 |
| SOUTHERN MARYLAND. | | | | | | |
| Charles | 15,042 | 8,571 | — 42.9 | 7.1 | 9.6 | + 2.5 |
| Calvert | 6,581 | 3,527 | — 46.4 | 7.6 | 7.0 | — 0.6 |
| St. Mary's | 18,554 | 12,444 | — 32.9 | 8.3 | 10.7 | + 2.4 |
| Anne Arundel | 10,854 | 6,237 | — 42.5 | 9.0 | 10.9 | + 1.9 |
| Prince George's | 14,181 | 8,250 | — 41.8 | 9.0 | 8.9 | — 0.1 |
| Average | | | — 41.3 | 8.2 | 9.4 | + 1.2 |
| EASTERN SHORE. | | | | | | |
| Worcester | 5,821 | 3,661 | — 37.1 | 7.1 | 9.6 | + 2.5 |
| Wicomico | 3,720 | 2,008 | — 46.0 | 7.2 | 10.2 | + 3.0 |
| Dorchester | 25,979 | 16,952 | — 35.1 | 7.6 | 12.3 | + 5.3 |
| Caroline | 18,336 | 19,617 | + 6.5 | 10.2 | 14.8 | + 4.6 |
| Somerset | 8,082 | 6,050 | — 25.1 | 10.3 | 14.7 | + 4.4 |
| Queen Anne | 41,223 | 49,313 | + 19.6 | 13.5 | 16.9 | + 3.4 |
| Talbot | 33,129 | 33,289 | + 0.4 | 14.1 | 19.9 | + 5 8 |
| Kent | 37,581 | 33,754 | — 10 1 | 14.8 | 17.2 | + 2.4 |
| Average | | | — 15.8 | 10.6 | 14.4 | + 3.9 |
| NORTHERN AND WESTERN MARYLAND. | | | | | | |
| Alleghany | 7,549 | 5,086 | — 32.6 | 8.9 | 11.7 | + 2.8 |
| Garrett | 4,122 | 2,652 | — 37.8 | 10.7 | 11.8 | + 1.1 |
| Baltimore | 28,629 | 26,369 | — 7.8 | 13.7 | 17.4 | + 3.7 |
| Carroll | 40,077 | 44,704 | + 11.5 | 14.4 | 17.7 | + 3.3 |
| Cecil | 29,875 | 28,812 | — 5.2 | 15.7 | 19.1 | + 3.4 |
| Howard | 18,445 | 17,628 | — 4 4 | 16.5 | 17.1 | + 0.6 |
| Harford | 25,143 | 20,071 | — 20.1 | 16.7 | 18.1 | + 1.4 |
| Montgomery | 35,673 | 30,237 | — 14.9 | 16.9 | 15.8 | — 1.1 |
| Frederick | 83,767 | 76,429 | — 8.7 | 16.9 | 16.1 | — 0.8 |
| Washington | 56,923 | 55,648 | — 2.2 | 18.0 | 17.5 | — 0.5 |
| Average | | | — 12.2 | 14.8 | 16.2 | + 1.3 |

The counties in the agricultural regions of the State are grouped together, and they are arranged in the order of the yield per acre in 1879, rather than in the last census year, because this was under the old regime when wheat was a staple crop in all parts of the State, and also because the climatic conditions of that season are believed to have been more nearly normal than in the last census year. The three most striking things about this table are the very great reduction in the acreage of wheat, the yield per acre, and the increased yield in 1889 over 1879. In adjusting itself to the new conditions and demands of the

market, it is natural that the cultivation of wheat will be given up first on those lands which are least productive, and we find this to be the fact. There has been a decrease of over 40 per cent. in the acreage of wheat in Southern Maryland. On the Eastern Shore there has been a reduction of 15.8 per cent., and this has been almost entirely in the four southern counties of Worcester, Wicomico, Dorchester and Somerset, which we shall see later are largely covered by typical truck lands similar to those of Southern Maryland. In Northern and Western Maryland there has been a reduction in acreage of about 12 per cent., and this has been principally in the coal regions of the extreme western part of the State. The reduction in acreage in Harford and Montgomery counties is probably due to other causes than the character of the land, and in the former it is probably largely due to the extensive canning industries and to the pasturage and fattening of cattle. None of the other counties show a very marked reduction in acreage, and Carroll county shows a considerable increase. It will be seen later, when speaking of the soils in these different agricultural regions in detail, that the prevailing soils in Southern Maryland, and in at least four or five counties of the Eastern Shore, are not suited to wheat, but that they are admirably adapted to fruit and truck, and this notable decrease in the acreage of wheat shows that they are being turned to uses in which they are far more profitable and more valuable.

In regard to the average yields per acre, given in the table, it will be remarked that they are seemingly very low. It must be remembered, however, that these averages are for entire counties, and include all varieties of soils, methods of cultivation and manuring. As before remarked and as will be shown later, the lands devoted to wheat culture, especially in Southern Maryland, in several counties of the Eastern Shore, and in the extreme western counties of the State, include large areas ill-adapted to the cultivation of wheat. This reduces the average yield per acre; and it is as harmful to the farmer himself to misuse his land by a cropping to which it is not adapted as it is to other producers whose lands are especially adapted to this crop, for it depresses the market value without benefiting the producer. It is from such lands as these which produce small yields per acre that so much is said of the hard times and the low prices of wheat, and it is such areas as these in which the acreage of wheat should be reduced and the lands applied to the raising of crops for which they are better suited.

It is hardly fair, therefore, to judge of these agricultural regions by the *average* yield per acre of wheat, because, after all, it does not interest a prospective settler to know what the average yield is or what a neighbor's yield is as much as to know what can reasonably be expected by his own methods of cultivation and manuring. It would be

fairer to judge by what a good farmer can expect, and for this these averages can, in nearly all cases, be about doubled. For example, the wheat lands in Anne Arundel and Prince George's counties, around Davidsonville, West River and Marlboro districts, produce eighteen bushels per acre with ease. On the good wheat lands in Queen Anne, Talbot and Kent counties, on the Eastern Shore, and in all the counties of northern central Maryland, together with Frederick and Washington counties, from twenty to thirty bushels per acre can be produced with ease, and as much as thirty to forty bushels can be depended on with the very best lands and with good farming. Yields as low as any of those given in the table would be considered very poor farming in any of the respective counties, and it would be safe to say that a good farmer could depend on twice this yield per acre on the better class of wheat lands in these different localities. Farmers in this locality cannot afford to grow wheat as a staple crop on lands which produce less than fifteen bushels per acre.

In comparing the yield per acre in the two census years, there are the two factors to be considered, the decrease in the acreage, which, by weeding out the lands least adapted to wheat culture, would tend to increase the average yield, and the difference in the climatic conditions of the two seasons. It will be remembered that the season of 1888-89 was decidedly wetter than that of 1878-79, and there were about 50 per cent. more rainy days. The increased precipitation and generally more moist conditions, unless altogether too wet, would be favorable and would tend to increase the yield on the lighter soils, but might depress the yield on the heavier soils. It will be seen from the table that, as a rule, the greatest increase of yield per acre in 1889 over 1879 was in those counties where the yields were smallest, and, as we shall see, where the lands are generally lighter in texture.

On the whole there is seen to have been a remarkable decrease in the acreage of wheat, especially in those counties where the yield is low, and where, as will be seen later, the soils are too light in texture to give profitable yields per acre of wheat. The staple crops of the fertile limestone lands of Western Maryland, of the prevailing lands in Northern Central Maryland and the heavier lands on the Eastern Shore, will always be grass, wheat and corn, because these lands are sufficiently strong to give large yields of these crops per acre; but still there are many other crops admirably adapted to these lands and to the peculiar market advantages of this locality, the cultivation of which could be profitably extended.

*Indian Corn.* There has been a very marked reduction in the acreage of corn as well as in that of wheat, and this has been general throughout all of the counties, as will be seen by the accompanying table.

**ACREAGE AND AVERAGE YIELD OF INDIAN CORN PER ACRE.**
**(Compiled from the Tenth and Eleventh Census.)**

| | 1879. Acres. | 1889. Acres. | Per Cent. Difference 1889. | 1879. Bushels. | [redacted] Bushels | Difference Bushels |
|---|---|---|---|---|---|---|
| State | 664,928 | 586,817 | — 11.7 | 24.01 | 25.44 | + 1.42 |
| SOUTHERN MARYLAND. | | | | | | |
| St. Mary's | 23,368 | 20,630 | — 11.7 | 15.5 | 15.4 | — 0.1 |
| Charles | 25,923 | 19,900 | — 19.4 | 15.9 | 14.1 | — 1.8 |
| Calvert | 10,848 | 7,830 | — 24.8 | 19.5 | 18.2 | — 1.3 |
| Prince George's | 28,897 | 23,836 | — 17.5 | 22.7 | 24.7 | + 2.0 |
| Anne Arundel | 29,674 | 24,561 | — 17.2 | 23.4 | 20.7 | — 2.7 |
| Average | ........ | ........ | — 18.1 | 19.4 | 18.6 | — 0.8 |
| EASTERN SHORE. | | | | | | |
| Wicomico | 41,214 | 36,459 | — 11.5 | 10.8 | 7.8 | — 3.0 |
| Worcester | 44,588 | 42,204 | — 5.3 | 12.7 | 10.6 | — 2.1 |
| Dorchester | 39,380 | 27,551 | — 30.0 | 16.4 | 13.3 | — 3.1 |
| Caroline | 30,590 | 21,364 | — 30.1 | 16.7 | 17.4 | + 0.7 |
| Somerset | 22,594 | 19,108 | — 15.4 | 17.2 | 13.3 | — 3.9 |
| Queen Anne | 38,654 | 34,639 | — 10.4 | 24.2 | 20.7 | — 3.5 |
| Kent | 29,937 | 27,731 | — 7.4 | 26.4 | 28.4 | + 2.0 |
| Talbot | 26,053 | 20,133 | — 22.6 | 26.5 | 27.2 | + 0.7 |
| Average | ........ | ........ | — 16.7 | 18.9 | 17.3 | — 1.3 |
| NORTHERN AND WESTERN MARYLAND. | | | | | | |
| Garrett | 3,714 | 3,290 | — 11.4 | 23.5 | 28.3 | + 4.7 |
| Allegheny | 8,661 | 6,513 | — 24.8 | 23.9 | 20.3 | — 3.6 |
| Howard | 17,915 | 18,377 | + 2.5 | 28.2 | 34.2 | + 6.0 |
| Carroll | 31,983 | 33,624 | + 5.1 | 28.5 | 37.5 | + 9.0 |
| Montgomery | 35,287 | 32,840 | — 6.9 | 28.9 | 36.3 | + 7.4 |
| Baltimore | 39,433 | 33,825 | — 14.2 | 30.5 | 37.3 | + 6.8 |
| Cecil | 25,764 | 23,905 | — 7.2 | 32.9 | 34.8 | + 1.9 |
| Washington | 31,920 | 32,832 | + 2.9 | 33.5 | 30.0 | — 3.5 |
| Frederick | 52,002 | 51,782 | — 0.4 | 34.1 | 38.4 | + 4.3 |
| Harford | 26,506 | 23,890 | — 9.9 | 38.8 | 37.9 | — 0.4 |
| Average | ........ | ........ | — 6.4 | 30.2 | 33.5 | + 3.3 |

The total acreage of corn is considerably larger than that of wheat, but it is somewhat differently distributed. There is a much larger acreage of corn than of wheat in southern Maryland and in the lower counties of the Eastern Shore, but there is generally a lower acreage in the wheat-producing counties of the Eastern Shore and in northern and western Maryland. Thus in 1879 there were 3,720 acres in wheat and 44,588 acres in corn in Worcester county, while in Washington county, where the heavy limestone lands prevail, there were 56,923 acres in wheat and only 31,910 acres in corn, considerably less than in Wicomico county. There are several reasons for this. In the first place, the fine wheat lands are too valuable for wheat and grass to put in corn, and wheat does not do so well after corn; the heaviest wheat and grass lands are not the best for corn; there is a great deal of land in southern Maryland and in the lower counties on the Eastern Shore which will produce corn much better than it will wheat; and on account of the lower yield per acre it takes a larger acreage to provide grain and fodder

for the stock, especially as there is comparatively little hay or pasturage where these light lands prevail.

The decrease in acreage has also been somewhat greater. In the counties showing a small average yield per acre of wheat there is a relatively small acreage, and the notable decrease of from 35 to 45 per cent. in acreage in these counties did not count for much in the State, as a whole. With corn, however, this is not so, for Wicomico and Worcester counties are shown to have the lowest average yield per acre, but there is only one other county which has a larger acreage. The acreage of corn in southern Maryland is about the same as in that of the finer wheat-producing counties, although the average yield is only about one-half or two-thirds as much per acre. While there is not, therefore, as much apparent decrease in acreage in the different counties, yet the more even distribution in the acreage makes the actual decrease of area in corn a little more than that in wheat.

*Tobacco.* This has been a staple crop in Maryland from the very earliest colonial days, and has contributed more than any other factor to the growth, prosperity and commercial importance of this State. For upwards of two hundred years Maryland and Virginia produced nearly all the tobacco which was consumed in Europe. Very stringent laws prohibited the growing of tobacco in many of the European countries to secure a revenue through the importation of tobacco from this country.

For a time Virginia obtained some revenue directly through an export tax. The cultivation of tobacco increased so rapidly in the two colonies that an effort was made to maintain the value of the crop by legislative enactments, as the rapidly increasing production tended to lower the price. In 1619, 20,000 pounds of Virginia tobacco were exported; in the next year this exportation had increased to 40,000 pounds; in 1621, 55,000 pounds, and in 1622, 60,000 pounds. In 1639 such a quantity was produced that half the crop was ordered to be burnt to reduce the amount to 1,500,000 pounds. The following year the value was fixed by law at 12 pence per pound, and in 1641 this was increased to 20 pence. In 1664, however, Virginia gave up this attempt to determine the value of the product, as Maryland would not agree to the necessary restrictions to keep up the price, and the production rapidly increased, while the price fell as low as 10 shillings per hundred-weight in 1662. As early as 1638 tobacco was the universal tender for all debts, public and private; and so continued for about 100 years, during most of which time it fluctuated between 1d. and 2d. per pound. The Legislature of 1732 fixed the price of inspected tobacco at 12 shillings 6 pence per hundred-weight. At this time about 30,000 hogsheads were produced in the State annually.

The production of tobacco has varied greatly, from time to time, for various causes. In 1790 the total exportation from the United States amounted to 118,460 hogsheads, which was not exceeded in any one year until 1840, when 119,484 hogsheads were exported; but at the same time the total value of the crops often amounted to as much in years when only half this amount was produced.

In 1825 the crop in Maryland amounted to 15,924 hogsheads, in 1846 it was 41,029, and in 1860 there was the largest crop which has ever been produced in Maryland—51,247 hogsheads. In 1865 the yield was 25,479 hogsheads; in 1879 it was 46,521; in 1890, on account of the very unfavorable season, the yield was 14,027 hogsheads, but in 1891 the yield had increased again to 27,336 hogsheads. In 1892 the yield was about 21,000 hogsheads, of excellent color and quality. Of this France alone contracted for about 13,000 hogsheads.

Tobacco, until the late war, was produced in all the counties of the Eastern Shore. Since the abolition of slavery, however, the cultivation of tobacco has been given up entirely on that shore, and in 1889 only one acre, yielding fifty pounds, was reported in the Census, although in 1849 over 8,000,000 pounds had been raised in Queen Anne's county alone. The production of tobacco in Maryland is at present confined almost exclusively to the southern counties, although a small amount is produced in some other localities, especially in Montgomery, Howard and Frederick. During the present century, and especially within very recent years, the total production of tobacco in the United State and in foreign countries, has been enormously increased. It has extended to all but one or two States in this country, and large quantities are produced abroad. This great increase of production has been accompanied, of course, by a falling off in the price per pound, and the common grades of tobacco bring very low prices at present. The market demands, however, are constantly changing, and the farmers are introducing those grades which command the highest prices.

The Maryland tobacco is strictly an export tobacco, and goes principally to Holland, France and Germany. France alone usually contracts for about 10,000 or 13,000 hogsheads of Maryland tobacco. It is very mild, has a sweet flavor and free burning qualities, making it specially suited for pipe smoking. For a long time Maryland, Virginia and Ohio were the only States which produced the light grades of tobacco suitable for pipe smoking, but other tobaccos have of late years come into competition with them. On account of this competition, a series of very unfavorable seasons for tobacco, the deterioration of the tobacco lands, and less perfect methods of cultivation, manuring and handling, the crop has brought very low prices of late years, and many farmers are turning their attention to other crops.

The accompanying table shows the acreage and yield per acre of tobacco in the two census years, compiled from the returns of the Tenth and Eleventh Census.

ACREAGE AND AVERAGE YIELD OF TOBACCO PER ACRE.
(Compiled from the Tenth and Eleventh Census.)

| | 1879. Acres. | 1889. Acres. | Per Cent. Difference 1889. | 1879. Pounds. | 1889. Pounds. | Difference Pounds. |
|---|---|---|---|---|---|---|
| State | 38,174 | 17,966 | — 52.9 | 683 2 | 687.7 | — 4.5 |
| SOUTHERN MARYLAND. | | | | | | |
| St. Mary's | 5,528 | 2,904 | — 47.4 | 801.2 | 847.1 | — 45.9 |
| Anne Arundel | 6,271 | 3,750 | — 40.2 | 708.1 | 561.5 | — 146.6 |
| Calvert | 6,848 | 3,683 | — 46.2 | 567.5 | 483.7 | — 83.8 |
| Charles | 7,913 | 3,651 | — 53.8 | 650.2 | 551.8 | — 98.4 |
| Prince George's | 9,637 | 5,322 | — 44.7 | 682.2 | 603.1 | — 79.1 |
| NORTHERN AND WESTERN MARYLAND. | | | | | | |
| Baltimore | 12 | 11 | — 8.3 | 800.1 | 1240.9 | + 440.8 |
| Cecil | 43 | 1 | — 97.6 | 1372.9 | 1100.0 | — 272.9 |
| Harford | 52 | 154 | +196.1 | 1309.3 | 1066.5 | — 242.8 |
| Carroll | 162 | 60 | — 62.9 | 846.7 | 916.6 | + 69.9 |
| Howard | 208 | 115 | — 44.7 | 667.9 | 797.2 | + 129.3 |
| Frederick | 429 | 162 | — 62.2 | 864.4 | 759.8 | — 104.6 |
| Montgomery | 1,053 | 460 | — 56.3 | 765.4 | 729.6 | — 35.8 |

NOTE.—No tobacco was returned from the Eastern Shore in 1889, except one acre from Wicomico, yielding fifty pounds.

No tobacco was reported from Alleghany, Garrett and Washington counties in 1889.

It will be seen that the production of tobacco is, at present, nearly confined to the five Southern Maryland counties. There has been a reduction of over 50 per cent. in the acreage of tobacco, which is pretty evenly distributed in all sections of the State. This decrease in the acreage of tobacco is undoubtedly accompanied by an increased acreage of fruit and truck. It will be seen later, in describing the tobacco soils, that efforts are being made to introduce other varieties of tobacco, and with the great diversity of soil formations in the State, there is no reason why a different tobacco should not be successfully produced which would meet the higher demands of the market.

It will be seen also, in describing the tobacco soils, that the tobacco plant is extremely sensitive to climatic conditions, and for this reason, as well as on account of the notable reduction of over 50 per cent. in the area planted, it would not be proper to draw any close comparisons between the yields per acre in the two census years, especially as both seasons were extremely unfavorable to this crop.

*Truck and Fruit.* It has been stated that the area devoted to the cultivation of the staple crops, grass, wheat, tobacco and corn, has notably decreased in the past decade, and this is largely due to, or is at least compensated for, by a notable increase in the acreage of fruit and truck. This is the direction agriculture is taking at present.

It is difficult to obtain figures which will show this change exactly, as the census returns of grass are not yet compiled, and the truck returns have been on a different basis from that formerly taken. The value of market-garden products sold in 1879 is given in the tenth census, at $873,968, and over 60 per cent. of this is credited to Baltimore county, and is probably market gardening proper as distinguished from truck farming, as these two industries are separated and defined in the eleventh census. In the eleventh census the value of the products of truck farming alone for the Baltimore district, exclusive of market gardening, is $3,784,696 with $2,413,648 additional accredited to the peninsula comprising Delaware and the Eastern Shore counties of Maryland and Virginia. The Baltimore district includes all Maryland, except the Eastern Shore, also West Virginia, and a few counties of Virginia not in the peninsula and Norfolk districts. Mr. J. H. Hale, special census agent, writes that most of this truck came from Maryland, and but little from West Virginia and the few counties of Virginia that send their products to the Baltimore market. There can be no direct comparison between the results of the two census years, but these figures will serve to indicate to what vast proportions this interest of truck farming is growing.

In 1889 the value of the products of truck farming, exclusive of market gardening, peaches and small fruit, for Maryland alone must have been at least $4,000,000, although the season of 1889 was an unfavorable one for these crops. In this same year the statistician of the U. S. Department of Agriculture estimated the total value of the wheat crop of the State at $4,998,124, and of the corn crop at $6,495,031, so that in point of value the truck compares favorably with either of these staples, and with market gardening and fruit it far exceeds these other interests, and in point of fact it is constantly and rapidly increasing in volume and in value, while the wheat and corn acreage is decreasing. Very large areas of land well suited to truck have not yet been taken up on account of a lack of transportation facilities.

Then again, this truck was produced on not over 50,000 acres, but to produce the wheat and corn crops Mr. Dodge estimates that 546,064 and 733,239 acres respectively were required. The average value of the truck land is about $98 per acre, as given in the Census Bulletin, No. 41. The average value of corn and wheat lands in the State can hardly exceed $20 or $30 per acre.

The distinction made between market gardening and truck farming in the eleventh census is thus stated by Mr. J. H. Hale:

"The production of fruits and vegetables for market has always been prosecuted with great success, in earlier days as a branch of general farming, and more recently as a specialty known as market gardening. The business is usually carried on with a few highly-enriched and

thoroughly-cultivated acres of ground and a rotation of crops, so grown that there may be a daily supply throughout a considerable portion of the year. The farms are usually within a reasonable driving distance of cities and towns, and the products are generally sold to the retailers, and in many cases, especially in the larger towns, directly to the consumer.

"Truck farming, although it also consists in the production of green vegetables for market, is distinguished from market gardening by the fact that, while the market gardener lives near a market and delivers his products with his own teams, usually producing a general variety of vegetables, the truck farmer lives remote from market, is dependent upon transportation companies and commission men for the delivery and sale of his products, and usually devotes himself to such specialties as are best suited to soil and climate.

"Of the vegetables grown by the truck farmers the leading classes are as follows: Watermelons, cabbage, peas, asparagus, melons other than watermelons, sweet potatoes, tomatoes, spinach, Irish potatoes, celery and string beans, ranking in acreage in the order named; beets, cucumbers, cauliflower, carrots, egg-plants, kale, lettuce, lima beans, parsnips, radishes, rhubarb, squashes, sweet corn and turnips are also grown as truck-farm crops, but only to a limited extent as compared to the first named. These, and other vegetables not here mentioned, being grown mostly by market gardeners than by truck farmers."

The following table gives the acreage and the net income per acre of the leading classes of vegetables on truck farms in the Baltimore and peninsula districts. This does not take into account the vegetables grown in market gardens near local markets, nor where the crop is grown in large quantities, as field crops, as is frequently the case with potatoes:

NUMBER OF ACRES AND NET INCOME PER ACRE ON LEADING VARIETIES OF VEGETABLES.

Eleventh Census, Bulletin No. 41.

| BALTIMORE DISTRICT. | | | PENINSULA DISTRICT. | | |
|---|---|---|---|---|---|
| | Acres. | Dollars. | | Acres. | Dollars. |
| Peas | 5,170 | 29.50 | Sweet Potatoes | 4,860 | 48.60 |
| Cabbage | 4,165 | 96.50 | Cabbage | 3,375 | 95 00 |
| Tomatoes | 3,780 | 84.00 | Peas | 3,224 | 26.00 |
| Sweet Potatoes | 3,150 | 52.10 | Asparagus | 2,640 | 64.00 |
| Irish Potatoes | 2,860 | 68.50 | Watermelons | 2,460 | 43.00 |
| Asparagus | 2,270 | 87.75 | Spinach | 2,128 | 32.60 |
| Spinach | 1,980 | [illegible] | Irish Potatoes | 1,295 | 77.25 |
| Watermelons | 620 | 42.00 | String Beans | 615 | 32.00 |
| String Beans | 585 | 28 70 | Kale | 590 | 50 00 |
| Cucumbers | 360 | 27.50 | Tomatoes | 416 | 43.00 |
| Kale | 261 | 47.00 | Cucumbers | 313 | 26 00 |
| Celery | 198 | 67.75 | Celery | 97 | 66.00 |
| Beets | 134 | 80.60 | Beets | 67 | 60 00 |
| Miscellaneous | 11,048 | ........ | Miscellaneous | 3,725 | ........ |
| Total | 37,181 | | Total | 25,714 | |

To produce this truck a very intense system of cultivation is practiced, and the expenses are very great, while much of the success, after all, depends upon the season and the condition of the markets. It frequently happens that a crop bringing a good price when marketed, would not have paid for the expense of transportation if put on the market a day or two later. The truck planters, therefore, aim to get their products to market at the earliest possible moment.

First-class truck land varies in value from $50 per acre to $200 per acre, or even more, depending upon the kind and condition of the soil, and particularly upon the location and ease of transportation. Land immediately on the water is worth several times as much as similar land two or three miles from the water or railroads, on account of the difficulty and expense of transporting the tender and bulky crop, and the damage done in the hauling and handling. Many of the very finest truck lands in Southern Maryland are lying out as barren wastes, and can be purchased for a merely nominal sum of from $1 to $5 per acre, on account of the present lack of transportation facilities. When this country is opened up and developed by railroad lines, which will foster this interest, thousands of acres of the very finest truck and fruit lands will be available, and the southern portion of the State will be one vast market garden.

The labor on these truck farms is scarce, and wages are necessarily high. The work is both continuous and exacting. Good laborers get from $12 to $20 per month, with rations and a house. Skilled laborers get more. Women get from 50 cents to 75 cents per day, and men from 75 cents to a dollar. The labor cost, on the leading varieties of vegetables, as given in the Census Bulletin (No. 41), in the two districts under consideration, ranges from about $10 to $30 per acre. The cost of seeds and plants ranges from 50 cents to $10 per acre, depending upon the kind of vegetable. The fertilizer cost is from $10 to $50 per acre, while the average net income per acre is estimated at from $30 to $100. Certainly this is beyond all comparison more profitable than wheat or corn, besides the possibility of creating new or larger demands. Transportation facilities are constantly inproving and enlarging, and the use of refrigerator cars, holding as much as four tons of ice, has made it possible to transport vegetables to almost any distance in a fresh and healthy condition; new markets for early truck and fruit are opening up in the West and as far north as Canada. What may be done by the introduction of new vegetables may be seen in the case of the tomato. As late as 1830, the tomato was grown only as a curiosity, and as an ornamental plant in gardens. It was hardly known as an edible plant, and, indeed was by many considered poisonous. It is now one of our principal crops, and is a staple article of food in nearly all families the

year round. It is used in its fresh state during its long season, and there is an enormous industry in canning it for winter use. The market demands have been increased by forcing the plants to an early maturity, and by improved transportation facility. Only five or ten years ago tomatoes, in the early spring before the local crop was ripe, were a luxury, which few could afford; now successive crops are brought here in abundance from the South, and they become a staple article of food almost as soon as the winter is over. In our own State they are forced under glass, or on the light truck soils, to an early maturity, when they still bring a good price, while the later crops, from the heavier soils of the State, are extensively canned for winter use. Much the same may be said of strawberries, of lettuce, celery, asparagus, and many other crops which were considered luxuries a few years ago, but which now are staple articles of food during a comparatively long season, even in families of moderate means.

It will be seen presently in describing the soils of the State that much of the success of truck farming is due to the character of the soil. Light sandy lands are most valuable for this industry, because when properly treated the crop ripens much earlier than on the heavier lands and, in consequence, demands a much higher market value. The aim of the truck planter is to get the crop to market at the earliest possible date, or else to delay it until the crops from the other parts of the State have given out. On the heavier lands of Northern-Central and Western Maryland, most of these vegetables may be grown with great success, and, as a rule, the plants are much larger and yield more per acre, but the crop is later in coming to maturity. It reaches the market from one to three weeks later than the crop from the lighter truck lands, and it must come into competition with similar crops from all parts of the State. As a consequence, there is usually a glut in the market and the crop frequently does not pay for the expense of transportation. The whole business of truck farming is comparatively new, having existed as a separate industry only since 1860.

Where the crop cannot be sold with profit in the fresh state, it may be canned and preserved for winter use, and this canning industry has grown of late years to enormous proportions, and has given a great stimulus to truck farming. Maryland has been the leading State, and Harford the leading county for this industry until 1891, when from various causes, and partly on account of variable seasons, New Jersey took the lead, to yield it again, however, in 1892.

The largest yield of tomatoes was in 1888, when 968,733 cases were put up in this State alone, each case holding two dozen cans. In that same year there were over a million cases of corn put up in the State,

although this figure is far in excess of the production in subsequent years.

In Harford county there has been a larger area planted in tomatoes for canning purposes than in any similar extent of territory in the United States, and this industry has replaced, to a large extent, the cultivation of the old staples, wheat and corn. Tomatoes and corn are the principal crops in these northern counties; in the southern counties and on the Eastern Shore, peas, beans, strawberries, peaches and cherries are extensively raised for canning.

A greater part of the tomato crop, and nearly all the corn crop is packed by local canning houses, although when the peach crop is short, many of the city packers turn their attention to tomatoes. As a rule, the other vegetables and fruits are shipped to the cities for canning.

As there is no particular purpose in having the crop intended for canning mature early, the yield and quality of the crop is of more importance, and the soils are selected with reference to these particulars. The lighter soils of the gneiss and gabbro formations are selected for this purpose because they are easier worked and the crops mature better than on the heavier lands.

The bulk of the pea crop is grown in Anne Arundel county. In 1892 365,000 bushels of peas were canned from this one county, as estimated by the Canned Goods Exchange, and this is a low estimate, for it does not include the product of the local canning factories.

The production of fruits did not exist in this State as a separate industry before 1830. At this time there were only a few peach orchards adjacent to Baltimore City, and the cultivation of strawberries was confined to small areas in market gardens. About this time, however, a Mr. Cassidy came from Philadelphia and bought three hundred acres of land in Cecil county and put out the first large peach orchard in the State, except those in Anne Arundel county supplying the local Baltimore market. Mr. Cassidy sold his crops in Philadelphia for excellent prices, and this stimulated the growing of peaches on the Eastern Shore, and the industry spread with great rapidity. By 1840 the peach crop exceeded the market demands, and there was a glut in the market, the crop bringing the lowest prices which have ever prevailed. This demoralized the peach growers, and many orchards were subsequently rooted up. About this time, however, the canning interest sprang up, and not only relieved the market at that time but it has constantly and steadily increased the demand.

The peach interest is at present confined to the Eastern Shore, Southern Maryland and to the mountains in the far western part of the State, which latter has been treated of in another place.

There are few peaches now grown in Cecil county, where the industry was introduced into the State, or in the northern central counties, as peaches do not do well on these heavy gabbro and gneiss soils.

The peach interest has been steadily moving southward on the peninsula for some years back. About forty years ago the "peach yellows" seriously crippled the peach industry in New Jersey, and this disease has been gradually spreading southward, and has destroyed many of the orchards in Delaware and in the northern counties on the Eastern Shore, but it is not felt at all in the southern counties of the peninsula.

The Eastern Shore counties rank in the importance of the peach industry about as follows: Kent, Queen Anne, Caroline, Dorchester, Talbot, Wicomico, Somerset and Worcester; but the industry is rapidly extending in the lower counties, and it is believed that before long this will be the great peach-producing area. In southern Maryland the industry is very extensive in Anne Arundel, Calvert and St. Mary's counties.

It is impossible to get exact figures of the total peach crop, as the crop is shipped in such various ways. The most trustworthy estimates, however, place the average crop of the peninsula, including Delaware and the Eastern Shore counties of Maryland and Virginia, at 2,000,000 bushels, although it has at times reached double this amount, and has been almost a failure in other years. The mountain peach industry has an advantage over the lowland crop in that the mountain crop is seldom, if ever, a failure, while the lowland crop is very frequently injured by late frost. The two crops do not conflict, as the mountain peaches come in after the lowland crop is over and bring an excellent price.

Before 1830 strawberries were confined to small patches in market gardens near the cities. Between 1830 and 1840 a Mr. Crisp came over from Kent Island and put out a large strawberry bed in Anne Arundel county, not far from Baltimore. He shipped the berries to Philadelphia and got an excellent price for them; and these were probably the first berries shipped from the State. The interest thus started spread rapidly, and it is estimated that in 1892 no less than 1,000,000 quarts of strawberries were shipped to northern and western markets from Anne Arundel county alone, besides a large quantity consumed in the Baltimore market. The introduction of the refrigerator car has widened the market for strawberries enormously. Four tons of ice are put into these cars, and the berries can then be shipped to Canada and opened in almost as good condition as when they left home; and the cry of "Ann Aranel" strawberries is about as familiar and as welcome in Montreal as it ever has been in the Baltimore markets.

The crop is shipped direct by the producer to New York, Boston, Canada, Pittsburg, Cleveland, Cincinnati, and to all points reached by a

single railroad system, where the cars can be billed through and run on a fast freight schedule. In this way they can be sent by fast freight about as quickly and usually for about half the cost as when sent by express.

It is interesting to note the way the direction of shipments changes as the season passes. Early crops come to the Baltimore market, or pass through it from the South, in successive crops from Florida, South and North Carolina and Virginia, and then, when our own crop is passed, berries are shipped here from New York and other northern points; so the crop goes up the coast and back once in a season, and the intermediate points have both a northern and southern trade.

The strawberry interest is greatest in Anne Arundel county, although it has lately assumed large proportions in Baltimore and some of the other northern counties. It has been taken up with great interest in all the Eastern Shore counties, especially in Wicomico, Caroline and Somerset. The admirable railroad and water facilities on the Eastern Shore, together with the peculiar nature of the land, adapt this region particularly to the fruit and truck interest.

Pears have not been grown to any very great extent as a special industry in this State, but of late years the interest has been increasing. This is the case especially on the Eastern Shore, where pears are replacing peaches to a very considerable extent in the northern counties. It is said that the blight, which has been very destructive in other parts of the State, gives little trouble on the Eastern Shore, and that where it does occur it yields readily to treatment.

Wild blackberries grow very abundantly in southern Maryland and on the Eastern Shore, and this is even now a very important industry in the State. The first attempt at planting the improved varieties was in Anne Arundel county, about 1855, shortly after the introduction of the Lorton berries had aroused an interest in the culture. The cultivation of blackberries is an important industry in Anne Arundel and Baltimore counties, and in Caroline, Wicomico and the upper Eastern Shore counties.

Raspberries are cultivated quite extensively in Anne Arundel county, principally for canning and preserving.

The canning industry has greatly increased the demand for fruits and vegetables and has increased the value of the crops. Thirty years ago fresh berries usually sold in Baltimore for about one cent per quart. They now bring five or ten cents per quart, and even more. Peaches retailed at about ten cents per peck, but now average about thirty cents. Peas brought about forty cents per bushel, and now bring, on an average, about $1.20 per bushel.

*Dairying.* The production of milk and butter on the farm for home consumption and, to a limited extent, for near markets, has always been successful in certain sections of the State; but, like truck farming, dairying has only existed as a separate industry within recent years, and it has grown very rapidly on account of improvements in dairy methods and of the great extension of markets by the improved transportation facilities. The dairy interest entered this State from Pennsylvania, butter being at first the principal product. Within very recent years the milk trade has replaced the butter to a very large extent, as new markets have been opened, or rather as means of transportation have been improved. The principal markets for milk are Baltimore, Washington and Philadelphia, in the order named, and the milk trade is carried on within a radius of about twenty-five miles of these centres. Harford, Baltimore and Montgomery counties are the largest milk-producing counties in the State, on account of their location near Baltimore and their excellent transportation facilities. Frederick, Carroll and Cecil counties come next in order in the extent of the milk trade. This interest has grown to very large proportions. The milk trade is practically confined to those portions of the State where hay and pasturage or other good forage can be produced, and it is further limited by distance from the markets and by the means of transportation.

The second advance in the development of the dairy interest in the State was in the introduction of creameries for the disposition of milk which was too far from the markets to be sold as such. The first creamery was established in the State about 1884, and they have rapidly increased until there are at present between fifty and sixty establishments in different parts of the State. There are a few co-operative creameries where the owners of the cows also own or have an interest in the factory and divide the expenses and the profits of the business. Most of the creameries, however, are proprietary affairs owned by an individual or a company, where milk is bought outright for a certain sum per 100 pounds.

The creameries are not confined to butter-making alone, but in certain times of the year and in certain conditions of the market cream and ice-cream are sold in large quantities. Some of the skim-milk is made into cheese, but it is usually considered a waste product and is fed to hogs. The manufacture of cheese has never been much of an industry in the State.

There is still much farm dairying and much butter is made on the farms, but large sections have changed to the production of milk, and farmers are selling more and more of their milk to the creameries rather than manufacture it themselves into butter. The rapid growth of the creamery interest has resulted from improved dairy methods, by which

dairying has been made independent of an ice supply, which was regarded as essential twenty years ago

The chief obstacle in the dairy interest, and one which is universally felt, is garlic. It is impossible to eradicate this from the pastures. Certain chemical methods have very recently been introduced in Holland by which the taint of garlic in the milk has been removed, and these may, perhaps, obviate this disadvantage.

The creamery industry is quite extensive in Howard, Montgomery, Frederick and Carroll counties, with Mt. Airey as a centre of the district. It is also an important industry in Cecil and Kent counties, and a few creameries are scattered as far south as Talbot county on the Eastern Shore.

The dairy stock is, for the most part, the native stock of the country with a strong infusion of Jersey blood. The Holstein-Friesian have been favorites with some for milk production for several years, and there are several fine herds in different parts of the State. Guernseys have been introduced within recent years and have been gradually increasing in numbers and favor. In the western counties farmers still cling to the Durham or Short-horn as the foundation stock.

*Fattening Cattle.* Another very important industry of a special line, which has attained very large proportions in this State, is the fattening of store cattle for market. The following information and account of this industry has been obtained mainly from Hon. David Seibert, of Washington county, Mr. Robert H. Miller, of Montgomery county, director of the Agricultural Experiment Station, and Mr. S. A. Williams, of Harford county.

Store cattle are purchased about the month of September, the number depending upon the size of the farm, the amount and condition of the pasturage and the amount of corn fodder and of other similar products which are available to feed them on. Usually from 10 to 100 head of cattle are purchased according to these conditions. Cattle weighing from 1,000 to 1,200 pounds are desired for this purpose, and those which come from Virginia and West Virginia are preferred. The cattle are at once turned out to pasture. and often they are not otherwise fed until they are sold the following year. When the winter is severe, however, the cattle are fed for two months on short or soft-ear corn, which is not considered marketable, and with corn-fodder, hay and straw. When the inferior corn is exhausted good ear-corn is often crushed with one-fifth oats, or light mill-feed bran is mixed with the crushed corn, and fed at the rate of three gallons to each animal per day. The pastures, however, are the main dependence, and usually the farm is stocked with reference to the extent and condition of the pasture. When sold, the smaller and lighter

cattle are sent to the Washington, Baltimore or Philadelphia markets, while the tops or best ones are purchased for the Liverpool market.

The price of store cattle and of fattened cattle varies greatly with the season and the state of the market. The prices for store cattle range from about $3 to $4 per 100 pounds gross weight. The selling price varies from about $4 to $5.25. The cattle are usually kept from eight to ten months, and they gain on an average from 300 to 450 pounds in that time, or about fifty pounds a month. This increase in weight and the advance in the selling price are supposed to cover the expenses of feeding and keeping the cattle, and a good deal of rough food is utilized in this way which would otherwise be wasted, and the lands are improved as they get the benefit of a large amount of manure produced.

This industry is confined principally to the northern central and western Maryland regions, where there is an abundance of grain, wheat, straw, corn and corn fodder. The interest is rather declining in northern central Maryland, as the margin is narrower between the buying and selling prices and other interests have taken the place of the old staples of grass, wheat and corn. It is increasing, however, in western Maryland, especially in Washington county, where the farmers are stocking their farms to the fullest capacity, realizing the benefit to the lands of having the stock in the increased production of the staple crops through the utilization of the rough food on the place and returning it to the land again in the form of manure.

### DESCRIPTION OF THE PRINCIPAL SOIL FORMATIONS OF THE STATE.

There is a greater number of geological formations in Maryland than in any other State, and consequently a very great variety of soils. To understand the variety of interests presented by this diversity of soils, and to know what crops are best adapted to the lands, we must understand these different soil formations and their relation to the growth and development of plants. It will be necessary to review very briefly the generally accepted views in regard to plant nutrition, so that we can understand why certain crops are best adapted to these different lands. We must try to understand why it is that a yield of thirty or forty bushels of wheat per acre can be obtained from the heavy limestone soils of western Maryland as readily as five or ten bushels from the light sandy truck lands of southern Maryland, or why truck will ripen much earlier on these light sandy lands than it does on the heavier wheat lands; for it is only when we understand these relations of soils to the life, growth and development of plants that we may hope to understand the adaptation of our different soils and the treatment best suited to maintain their fertility, or to increase their productiveness.

Much of this work on the Maryland soils has been done by the U. S. Department of Agriculture, and will appear later in the form of a bulletin. It is published here by permission of the Secretary of Agriculture. Credit should also be given the Maryland Agricultural Experiment Station for co-operation in the work for a period of about two years.

*The Prevailing Views of Plant Nutrition.* The prevailing views in regard to the nutrition of plants may be briefly stated. Before Liebig's time the mineral matter which composes the ashes of plants was generally believed to be an accidental impurity and not in any way essential to the life or growth of the plant; but since Liebig's doctrine of the mineral theory of plant growth it has been proved that plants require certain mineral substances for their life and normal growth. The most common and most abundant of these mineral substances are phosphoric acid, potash, lime, alumina, magnesia, iron, silica, sulphuric acid and the like. These mineral substances are necessary to build up the vegetable tissues, and to form the various organic substances which are contained in the cells, and they are required also for various physiological actions which take place in the growth of the plant; for example, potash is required in the transfer of starch and of other food materials from one part of the plant to another. These mineral matters are ordinarily obtained from the soil. Different plants require different amounts of this mineral matter. Thus, 100 pounds of pine wood contain less than half a pound of ashes or mineral matters obtained from the soil, all the rest of its substance being obtained directly or indirectly from the atmosphere. The tobacco plant, on the contrary, which is the grossest feeder we have among agricultural plants, contains from 15 to 25 pounds of mineral matter derived from the soil in one hundred pounds of the plants.

It has been proved, that of the mineral substances entering into the composition of plants, all are present in abundance and in an available form for plants to feed on in nearly all soils, with the exception of phosphoric acid, potash and lime, and possibly also magnesia and sulphuric acid. Soils rarely contain less than one ton of phosphoric acid and of potash per acre one foot deep, and usually from two to twenty tons of each, and when we consider that the roots of plants usually go very much deeper than twelve inches and that the surface of the ground is constantly wearing away a little, it will be seen that there is a very large amount of plant food in the soil for crops.

Nitrogen is another very important plant food, entering largely into the composition of organic matters. Strictly speaking, this is not of mineral origin, for the direct source of supply is the organic matter of the soil. It was probably originally derived from the atmosphere, but it has not yet been satisfactorily explained how the free nitrogen gas of

the atmosphere is converted into the organic matter of the soil, except that it has recently been shown to be principally through the agency of bacteria.

It was thought by Liebig and his immediate followers, that a comparison of the analyses of a soil and plant would show what was lacking in the soil for a large crop production. A plant having a large amount of lime in its composition, for example, would require a highly calcareous soil, while a plant having a large amount of nitrogen would require a soil especially rich in nitrogenous matters.

A large amount of work has been based upon this belief in the analysis of soils and plants, and tables have been prepared for calculating the exhaustion of soils by crops and their enrichment by manures. It has been clearly demonstrated, however, that there is no such simple relation between the ordinary chemical composition of plants and soils, as was at first supposed.

It has been shown that the amount of food material taken up from the soil by a single crop is relatively so small that its loss cannot be detected with any certainty by a subsequent chemical analysis of the soil, while the addition of no more than 20 pounds of potash or of phosphoric acid or of some nitrogenous compound, may insure a good crop where otherwise it would have been a failure. This quantity of plant food is relatively so small that if it were uniformly mixed with the soil it could not be detected by an ordinary chemical analysis. Furthermore, it has been shown repeatedly that very barren soils, or soils "worn out" and "exhausted," may have as much plant food, as shown by the ordinary chemical analysis, as other soils which are known to be exceedingly fertile.

It is no wonder that, as these facts become apparent, there should be a revulsion of feeling, and that these soil investigations should be discredited. Fortunately the investigations have not stopped here.

This plant food is derived from the disintegration of the mineral matters in the soil, such as the feldspar, mica, &c., and in the decomposition of these minerals new compounds are being constantly formed. For instance clay, which in its pure form is a silicate of alumina containing a little combined water, and the silicate of potash, which is a form of potash readily available to plants, are being formed from the decomposition of some of the feldspars and micas, while these decomposition products themselves may act on other constituents on the soil, forming new compounds, which are more or less readily available to plants. There are probably, therefore, constant and continual changes in the chemical composition of the soil ingredients. It is commonly held, nowadays, that only a small part of the plant food in the soil is in such a form of chemical combination as to be readily available to plants, and

that it does not accumulate in the soil in an available form, but if it is not taken up at once by plants it quickly reverts to a rocky or insoluble form in which it is no longer available.

It is further believed that plants differ in their capacities for extracting food from soils. It is a common expression that rye will thrive where wheat would starve. It does not follow, by any means, that a plant containing a relatively large amount of nitrogen in its composition does best on a highly nitrogenous soil, or that it requires a special nitrogenous manuring, for, as a rule, the highly nitrogenous leguminous plants, such as peas, respond more readily to phosphoric acid or to potash than they do to nitrogen. Other plants, requiring relatively large quantities of phosphoric acid or of potash or of lime, seem to be able to gather these ingredients with comparative ease from the soil, and respond more readily to an application of other plant food of which they contain relatively very little in their composition.

These two facts then are commonly held: that only a relatively small amount of plant food in the soil is in a form which is readily available to plants, and a soil is "worn out" or "exhausted" when the store of *available plant food* is used up or depleted, when means must be taken by rest, fertilization or by green manuring to increase this *available* food supply; and that plants vary in their powers of gathering food from the soil. Starting from this it was suggested that the direct question should be put to the soil to find out what was lacking for a maximum production; and with this object extensive series of field experiments with fertilizers have been carried out in all parts of this country and abroad.

It was at first thought, and is still held by some, that this method of field experiments with fertilizers would show what the different classes of plants require for their best development, and that from these results special fertilizers could be prepared for wheat, corn, cotton or for any other crop. Professor Atwater carried out a very extensive series of field experiments of this kind with the co-operation of farmers in all parts of the country. His results show, however, that even in such a comparatively small area as the State of Connecticut the corn crop required very different fertilizers on different farms; on one farm only phosphoric acid showed any marked effect in increasing the crop, on another farm potash, on another farm nitrogen, and on still another farm all three of these elements were required to give any marked increase in the crop.

These results are not at all uncommon nor exceptional. It is a very common experience that the same kind of plant requires different treatment and responds to different kinds of fertilizers on different soils; and further that they respond more readily to different fertilizers in different seasons. None of the various schemes which have been suggested for determining the amount of available plant food in the soil have given

much definite information of more than local interest in regard to the special requirements of plants or the soil.

The results of these field experiments, which have been carried on in some places for fifty years, are very uncertain and conflicting, and while they are doubtless of value in showing the general needs of a particular field, the results cannot be used with safety in the cultivation of the same crop on a different kind of soil.

It is as easy to produce forty bushels of wheat per acre on some of our heavy limestone lands as it is to produce five or ten bushels on some of the light truck lands of southern Maryland.

The conditions are so entirely different in these two types of soil that it is not to be expected that the same method of cultivation and of manuring which gave a yield of forty bushels on the limestone land would give an equally large yield on the truck soil; and it would be still more absurd to suppose that the methods used in the moist climate of England would give the same yield on these light truck lands. It is a source of great disappointment to many farmers to find a certain brand of fertilizer, a certain kind of treatment, or a certain rotation of crops which has been eminently successful on the heavy soils of western Maryland, or under the peculiar conditions prevailing in England, does not give the same results on the lighter soils of southern Maryland.

The time has passed for blindly following rules of manuring, cropping or of rotation simply because they have been successfully followed for generations in England. The conditions have altogether changed, and the successful farmer must specialize his work as the mechanic does, and raise only such crops as suit his conditions and surroundings.

The light fruit and truck lands of southern Maryland have been shown by a chemical analysis* to contain as much plant food as the fertile grass and wheat lands of northern central and western Maryland. So far as the total amount of plant food is concerned, the truck lands seem to have as much as many of the stronger types of land, but less available plant food.

Plants require relatively so little of the vast supply of food material in the soil, that if the low yield of wheat on these truck soils were due solely to a lack of available plant food it would be very easy to add to the soil as much plant food as would be required by a large crop; and it would be reasonable to expect in this case, as the plant would be independent of the soil for its food supply, that a large crop of wheat could thus be raised, but this is not so. For even if all the elements of plant food required by a large wheat crop were added to the truck soil in

*The chemical analysis is being made of samples of all the principal soil formations of Maryland by Prof. R. L. Packard, of the U. S. Department of Agriculture, at the Johns Hopkins University; and when this careful chemical work has been completed it will be published in a bulletin.

the most available form, there would be no certainty whatever that the yield would be very materially increased.

Let us inquire, then, what are the conditions which determine the peculiar fitness of the different soils in the State for certain crops, and see if we have these under any control, so that by changing these conditions we can influence the yield or quality of our crops.

This matter has been treated quite fully in Bulletin No. 4 of the Weather Bureau of the U. S. Department of Agriculture and in the Monthly Report of the Maryland State Weather Service, vol. 2, No. 10, January, 1893, both of which have been freely used in the preparation of this matter.

In a green-house, where all the conditions of plant growth are under nearly perfect control, the same kind of soil may be used to grow almost any kind of plant, whether it be oranges, bananas, pineapples, roses, geraniums, tomatoes, cabbages, lettuce or radishes. The same kind of soil may be used, but each kind of plant will require certain conditions of moisture and heat, and when these conditions are changed the development of the plant may be largely controlled. If a geranium be wanted for a simple foliage plant it can be kept from blooming and developed to a very large size with a great number of leaves by keeping the soil moderately warm and moist. If it be desired to have the plant bloom profusely the soil must be kept drier and cooler. Thus the development of the plant is under nearly perfect control, and it is very customary for florists to force their plants to any kind of development by the simple control of moisture and heat; to make large and leafy plants of them, or to keep them smaller by checking this excessive growth of foliage and make them put all their substance into a profusion of flowers and fruit.

We see the same effects in nature. In very heavy, wet soils and in wet seasons plants are inclined to grow very large, and they do not put on as much fruit as they should, considering the size of the plant and the amount of food-material they have gathered from the soil and air. Under these conditions tobacco plants are large and rank, the leaves are coarse and sappy and do not cure well or take on good color; on drier soils and in drier seasons the leaves have a finer texture and a brighter color. The cotton plant shows this influence of the wetness or dryness of the soil and of the season to a very marked extent, and wheat shows it, although to a less extent. Indeed, it is well known that the "season," that is, the conditions of moisture and heat, have far more effect upon the crop than fertilizers usually have. The effect of fertilizers themselves is very largely dependent upon the *season*. We find, then, that in nature as in the green-house the development of plants and the yield of crops is very largely dependent upon the conditions of moisture and heat under which they are grown.

We have a large number of distinct types of soils in Maryland, ranging in texture and in agricultural value from the very light, sandy soils of the pine barrens and of the truck lands to the very heavy limestone soils of western Maryland. The light, sandy soils are so open and porous that water readily descends through them after a rain. The heavy limestone soils, on the other hand, are so close in texture and so retentive of moisture that the rainfall passes down through them very slowly. The rainfall does not do the crops any good until it enters the soil. Even assuming that we have the same amount and distribution of rainfall over the whole State, the soils are so different in their retentive powers that some will maintain much more of this rainfall for the crop than others.

For example, the limestone soil will maintain, on an average, from 18 to 20 per cent. of water, or about 400 tons of water per acre one foot deep; while the light truck soils will maintain only about a quarter of this amount, that is, about 5 or 6 per cent. of moisture, or say 100 tons of water per acre. The limestone soil to the depth of one foot maintains an amount corresponding to 4 inches of rainfall, while the light, sandy truck land maintains an equivalent of only 1 inch of rainfall. Now the difference in the effect on a crop of a season when there are 4 inches of rainfall a month, and when there is only 1 inch of rainfall a month, is very great. For if we have an average of 4 inches of well-distributed rainfall a month a good wheat crop is assured on the limestone soils, but if we have an average of only 1 inch of rainfall a month the crop will be a failure. As a matter of fact we have, on an average, about 4 inches of rainfall a month in Maryland, and this is sufficient for a good wheat crop on the limestone soils, but, as we have seen, the light, sandy truck lands are so porous that they let this water down very freely, and only maintain for the crop an amount equal to about 1 inch of the rainfall. The effect is nearly the same as if the soil were uniform in both cases, and 4 inches of rain had fallen on the crop on the limestone soil, but only one inch had fallen on the other crop.

Now we have seen that if there should be as much difference as this in the amount of water supplied to plants in a green-house, that those plants which received the most water would develop into large, leafy plants, which would be late in coming to maturity, while the plants receiving the less amount of water would be smaller, but there would be a greater tendency to fruit, and the plants would mature much earlier. This is precisely the effect on the two soils under consideration. When wheat is sown on the sandy truck soil it does not tiller well, but throws up one or two stalks which attain hardly any size before each takes on a seed head and the plant ripens. The conditions have not been favorable for the development of a sufficient amount of foliage to gather enough

plant food from the soil and atmosphere for a large crop, but the plant has been forced to maturity before it has attained sufficient size. The crop is large in proportion to the amount of food material which has been gathered by the plant, but there is relatively so little of this that it gives a very small yield per acre. On the heavy limestone soil, on the other hand, the crop grows slowly, gets a good root development, tillers well, and produces a mass of foliage which gathers a quantity of food material from the soil and air.

The conditions in these light, sandy soils, while unfavorable as a rule to wheat and grass, are distinctly favorable for forcing crops to an early development, and this is what gives them their great value for early truck. By forcing these vegetables to an early maturity the crop is put on the market two or three weeks earlier than is possible on the heavier soils of the State, and it gets the benefit of a high market price; while the same crop grown on a limestone soil would be so late in coming to maturity that it would have to compete with all other parts of the State, and there would likely be a glut in the market and the crop would bring a very low price.

A number of samples of soils were taken in the truck area of southern Maryland which show the relation of the texture of the soils to the local distribution of plants.

The following table gives the mechanical analysis of the sub-soils, showing the amount of the different grades of sand, silt and clay:

MECHANICAL ANALYSES OF TRUCK AND WHEAT SUBSOILS FROM SOUTHERN MARYLAND.

| Diameter. | Conventional Names. | 472. EarlyTruck, Marley. | 467. Truck and Small Fruit. | 478. Peas, Tomatoes, Cabbage, Wheat. | 480. Strong Wheat and Grass. |
|---|---|---|---|---|---|
| *mm.* | | | | | |
| 2–1 | Fine gravel | 0.49 | 0.76 | 2.05 | 0.00 |
| 1–.5 | Coarse sand | 4.96 | 8.55 | 3.31 | 0.38 |
| .5–25 | Medium sand | 40.19 | 35.04 | 5 41 | 1.07 |
| .25–.1 | Fine sand | 27.59 | 19.26 | 2.89 | 0.78 |
| .1–.05 | Very fine sand | 12.10 | 8.42 | 6.06 | 3.41 |
| .05–.01 | Silt | 7.74 | 11.38 | 40.15 | 43.08 |
| .01–.005 | Fine silt | 2.23 | 4.13 | 13.14 | 13.81 |
| .005–.0001 | Clay | 4.40 | 10.59 | 23.84 | 30.21 |
| | Total | 99.70 | 98.13 | 96.85 | 92.80 |
| Organic matter, water, loss | | 0.30 | 1.87 | 3.15 | 7.20 |

| No. | Soil. | Clay. | Surface area. | Approximate number of grains per gram. |
|---|---|---|---|---|
| | | *Per Cent.* | *Sq. cm.* | |
| 472 | Early truck, Marley | 4.40 | 615 | 1,950,000,000 |
| 467 | Truck and small fruit | 10.59 | 1,244 | 4,767,000,000 |
| 478 | Peas, tomatoes, cabbage, wheat. | 23.84 | 2,242 | 10,923,000,000 |
| 480 | Strong wheat and grass land | 30.21 | 3,479 | 14,457,000,000 |

472 represents the very early truck lands of Marley, which will be described in another place. The other soils were taken about three or four miles from Marley, and are from the same farm and only a few hundred feet apart, so that all the soils are under practically the same meteorological conditions and have practically the same amount of rainfall.

480 is a strong grass and wheat land from a ridge having an elevation of about 160 feet. It would be classed anywhere as a strong wheat soil and very good grass land.

478 came from a level plateau or terrace just under the ridge, and was evidently formed of the same material. It is a much lighter soil than that on the top of the ridge, but it is still a good wheat land. It is too heavy for sweet potatoes and cantaloupes, and it is too heavy for early truck. It is considered a good tomato, corn and cabbage land, although the crops do not ripen as early as on the lighter soils. Peas do well on this land, but they cannot be grown two years in succession, for the large amount of nitrogenous matter in the roots and vines makes the soil very close and heavy, and the second year there is a large amount of pea vines, but a very small crop of peas is obtained from them. Wheat is nearly always sown after the peas, then grass, followed by corn, and then peas again. Some such rotation as this is necessary to keep the land open and in good condition.

467 is well suited to truck and small fruits. It is a coarse, sandy soil, and matures the crops very much earlier than either of those just mentioned. It is not as light in texture nor as early as the truck lands at Marley.

472 is a typical sandy truck land from Marley. The crop matures on this land from one to three weeks earlier than on the other soils mentioned, and while the yield per acre is not as large, the crop brings a very much higher market price.

The productiveness of these lands increases with the amount of clay they contain and with the number of grains of sand and clay per gram. These are the very conditions which determine the relation of the soils to water and the amount of moisture they maintain. It cannot be doubted that the peculiar adaptation of these soils to the different kinds of crops is due to the texture of the land and to the relation of the soils to water.

The strong clay soil (480) is not lacking in any particular plant food which would be required by a crop of sweet potatoes or of cantaloupes. It probably contains the elements of plant food needed by a crop of tomatoes, but the tomato vines would be large and bushy—they would be late in coming to maturity, and the yield would be very small in proportion to the size of the plants. All kinds of truck would be late in

coming to maturity. These are signs that the soil is too moist and has retained too much of the rainfall for the best and earliest development of these crops. These conditions are favorable to grass and wheat, for both these crops require a long and slow period of growth so that they can put on a large amount of foliage before it is time to ripen a crop.

The light truck land, on the contrary, will not grow a large crop of grass or wheat because the conditions are not favorable to the slow growth required by these plants to produce foliage to gather food material from the soil and air, as previously explained, for the crop.

If these truck soils were systematically irrigated, and the crops on them were supplied, either naturally or artificially, with more water than the soils themselves can maintain under existing climatic conditions, good crops of grass or wheat could be grown. The very conditions which make them unfit for grass and wheat, however, give them their peculiar value for early truck, as the crops are forced to maturity much earlier than they can be produced on the heavier soils of the State. With exactly the same rainfall these light truck lands will maintain about five or six per cent. of water, while the heavier grass or wheat land (480) will maintain about fourteen to sixteen per cent. of water.

It seems probable, from this and other evidence, that if the physical conditions of moisture and heat are favorable to the proper development of crops, that plants can, in general, get all the food they need from any soil.

The relative amount of moisture which these soils can maintain will depend not only upon how many grains there are in one gram, but upon the way in which these grains are arranged, as well as upon the amount and condition of the organic matter in the soil. It is a well known fact that the continued use of lime on stiff heavy clay lands makes them looser and more loamy, and less retentive of moisture. Indeed, lime is very injurious to light sandy lands unless there is sufficient organic matter "for the lime to act on." For if the lime is used on such lands when there is an insufficient supply of organic matter, the soils are made still less retentive of moisture. If there is sufficient organic matter, however, in the soil, or supplied artificially, for the lime to act on, it makes even these light soils closer in texture and more retentive of moisture. This is the reason why lime is so universally beneficial to all classes of soils; but with the heavy, impervious clay soils it must be used alone, while with the light sandy soils it must be used in connection with organic matter.

In the deterioration of lands, when soils become "worn out" or "exhausted," the texture of the soil changes so as to change the relation of the soil to water, and the soil may thereafter be able to maintain

either more or less water than formerly, which will make the conditions unfavorable for the crop.

The development of the crop shows very plainly that the conditions of moisture in the soil have changed, for the plants are either inclined to excessive growth of foliage, or they ripen up while the plants are still small, as the case may be.

Fertilizers have a very marked effect on the texture of soils, and it is possible, through their use, to change the arrangement of the grains of sand and clay, and so make the soil more or less retentive of moisture. We thus have in our manures and fertilizers very powerful means of maintaining or of changing the texture of the soil through the arrangements of the soil grains, thereby changing the conditions of moisture and heat, which they can maintain for the crop. This physical effect of fertilizers is probably of the very greatest importance.

The following table gives a list of the most important soil formations in Maryland, with their location, the crops best adapted to them, the average content of sand, silt and clay showing the texture of the lands, the surface area of the grains and the approximate number of grains in one gram.

The relative agricultural value of these lands for the staple crops is about as given in the table; the Trenton limestone being the finest type of grass and wheat land, and the Lafayette being the poorest in the State. The agricultural value for these staple crops increases with the percentage of clay.

THE MECHANICAL ANALYSIS OF SOIL TYPES, SHOWING THE TEXTURE OF THE SUBSOIL, OR THE RELATIVE AMOUNT OF SAND, SILT AND CLAY, AND THE SURFACE AREA AND APPROXIMATE NUMBER OF GRAINS IN ONE GRAM.

| Geological Formation. | Description of Soils. | Average Contents. | | | One Gram of Subsoil Contains: | |
|---|---|---|---|---|---|---|
| | | Sand. Per Cent. | Silt. Per Cent. | Clay. Per Cent. | Surface Area, Square Centimeters. | Approximate Number of Grains. |
| 1..Lafayette | Pine barrens of Southern Maryland | 90 | 5 | 3 | 496 | 1,692,000,000 |
| 2..Columbia | Early truck lands along the west shore of the bay and in Caroline, Wicomico, Somerset and Worcester Counties | 80 | 10 | 5 | 673 | 2,185,000,000 |
| 3..Columbia | Later truck and fruit lands along the bay | 70 | 15 | 10 | 1,244 | 4,767,000,000 |
| 4..Chesapeake | Tobacco lands of Southern Maryland (export tobacco) | 45 | 35 | 15 | 1,902 | 6,786,000,000 |
| 5..Chesapeake | Wheat lands of Southern Maryland | 55 | 20 | 20 | 2,380 | 9,357,000,000 |
| 6..Columbia | Wheat lands of river terraces along the Potomac and tributaries | 20 | 50 | 25 | 2,889 | 11,936,000,000 |
| 7..Chesapeake | Grass and wheat lands of Southern Maryland | 30 | 35 | 30 | 3,479 | 14,457,000,000 |
| 8..Chesapeake | Wheat and corn lands of Queen Anne and Talbot Counties (Eastern shore) | 30 | 35 | 30 | 3,479 | 14,457,000,000 |
| 9..Phillite | Wheat and corn lands of Harford, Carroll, Frederick, Howard and Montgomery Counties | 25 | 40 | 30 | 3,479 | 14,457,000,000 |
| 10..Gneiss | Grass and wheat lands ("Gray lands") of Harford, Baltimore, Carroll, Howard and Montgomery Counties | 25 | 40 | 30 | 3,479 | 14,457,000,000 |
| 11..Gabbro | Grass and wheat lands ("Red lands") of Harford and Baltimore Counties | 25 | 40 | 30 | 3,479 | 14,457,000,000 |
| 12..Triassic | Grass and wheat lands ("Red lands") of Carroll and Frederick Counties | 10 | 50 | 35 | 3,700 | 14,900,000,000 |
| 13..Catskill | Grass and wheat lands of Garrett and Alleghany Counties | 10 | 50 | 35 | 3,700 | 14,900,000,000 |
| 14..Chesapeake | Grass and wheat lands of Dorchester, Wicomico, Somerset and Worcester Counties. | 10 | 50 | 35 | 3,700 | 14,900,000,000 |
| 15..Helderberg | Grass and wheat lands of Washington and Alleghany Counties | 15 | 40 | 40 | 4,500 | 19,638,000,000 |
| 16..Trenton limestone | Grass and wheat lands of Cumberland and Frederick Valleys | 5 | 45 | 45 | 5,000 | 22,000,000,000 |

A number of the important soil formations of the State have not been studied in sufficient detail to enable them to be arranged in the above table, but these will be described further on.

The soils in the table have been arranged according to the percentage of clay in the subsoil, for this clay, as we have seen, practically determines the texture of the land, the relation of the soils to the rainfall, and the amount of water which the soils can maintain for the crops. When thus arranged according to their content of clay, the soils are in the order of their relative agricultural value for the staple crops; that is, the more clay the lands contain the more valuable they are for grass and wheat, provided the grains of sand and clay are well arranged. Another interesting thing is that the figures here given for the percentage of clay also represent very nearly the yield of wheat per acre which could be expected from these lands under good treatment. For instance, the same care and treatment which would be necessary to obtain a yield of forty to forty-five bushels per acre from the Trenton limestone, around Frederick or Hagerstown, would give about thirty bushels per acre on the gabbro, from ten to twenty bushels on the tobacco and wheat lands of southern Maryland, and from three to five bushels per acre on the light truck lands and pine barrens. Provided, therefore, that the grains of sand and clay are well arranged in the soil, the yield of wheat per acre under good treatment, and under the prevailing climatic conditions is very nearly expressed by the percentage of clay.

It is interesting also to note that the percentage of clay, as given in the table, represents very nearly the actual value of these lands for wheat, the land being worth about one dollar per acre for every per cent. of clay. The Trenton limestone lands are worth from $40 to $60 per acre, except where they are very favorably situated near towns and on first-class turnpikes, when they may be worth much more than this. If the Trenton limestone is worth on the average about $45 per acre, the gabbro soil would be worth about $30 or $35 per acre, the tobacco and wheat lands of southern Maryland would be worth from $15 to $25 per acre, and the early truck lands and pine barrens from $1 to $5 per acre for this staple crop. As a matter of fact, these are about the present market values of these lands for these staple crops.

The area and distribution of these lands can be seen on the accompanying geological and agricultural map of the State.

### THE PRINCIPAL SOIL FORMATIONS OF THE STATE.

The principal soils of the State have been classified according to their agricultural value or adaptation for the old staple crops—grass, wheat, corn and tobacco—and according to their geological origin. There are obviously many considerations which help to determine the real

market value of lands, apart from their adaptation to crops. For example, the distance to market, the ease and cost of transportation, and the condition of the roads over which the products have to be hauled have much to do with the market value of lands. These factors have not been considered in the classification. It must be remembered also that the soils are arranged in the order of their value for the old staple crops, and that the present agricultural values of these lands when devoted to the crops for which they are especially adapted are very different. For example, the truck soils, which come near the bottom of the list in their value for grass and wheat, have a market value for early truck much greater than the heavy limestone grass lands, where facilities are available for transportation of the truck to market.

### SOILS OF WESTERN AND NORTHERN CENTRAL MARYLAND.

The Trenton limestone forms the strongest and most fertile lands in the State, such as the fertile valleys around Hagerstown and Frederick. The limestone areas in the Piedmont Plateau and the marble areas north of Baltimore have soils which are very similar in texture to the Trenton limestone soils, and agriculturally may be classed with them.

The subsoil of the Trenton limestone formation contains about 45 per cent. of clay, and has about 22,000,000,000 grains of sand and clay in one gram, giving a very close texture and making the land very retentive of moisture. The grains have about 5,000 square centimetres of surface area in one gram (15½ grains), and this gives a very large extent of surface for water to act on in dissolving food material from the soil and for roots to feed on.

The limestone soils are not especially rich in lime, but, on the contrary, are usually deficient in this substance. The soils are the impurities which were originally contained in the limestone rock, which have been left behind as the lime has been dissolved and carried off by water. There is, of course, a very small amount of impurities in the limestone rock, and after the large amount of lime has been dissolved the impurities settle, and, as a consequence, the limestone soils are nearly always valley lands, with ridges on either side formed of rocks which were much less soluble than the limestone. Another important fact is that the lime is in the form of a carbonate, which is readily soluble in water containing carbonic acid gas in solution, whereas the lime, in most ordinary soils, is in the form of sulphate or silicate, either of which is much less soluble in water than the carbonate; so it happens that, strange as it may seem, these limestone soils are frequently deficient in lime, and there is no class of soils in the State which is more benefited by an application of lime than these same soils, resulting from the disintegration of the limestone rocks. It is frequently the practice, in these limestone regions, to

get out the rock, and burn it in kilns, and spread it directly on the land from which it came.

The limestone lands are underlain by a stiff, heavy yellow or red clay subsoil, sufficiently close in texture and retentive of moisture to maintain an abundant supply of moisture for the crop in all ordinary seasons. Nevertheless they have good surface and under drainage, and they are, for these reasons, admirably adapted to grass, and they form the finest type of grass land in the State.

There are in the Cumberland valley a number of different grades of soil. Along the rivers the subsoils are very heavy, stiff clay, with from six to eight inches of somewhat lighter loam soil on top. On the ridges, between the rivers, the lands are lighter, the stiff yellow clay is found at a greater depth, and the lands are not as strong nor as fertile. Farmers recognize this fact, and value the land according to its texture. The heavier lands, wherever this stiff yellow or red clay comes within eight or ten inches of the surface, are more valuable for grass; the lighter lands are rather better for wheat, and the still lighter loams, where this clay is from twelve to eighteen inches below the surface, are better for corn; the heavier lands are more valuable for general farming, and they can stand more ill-usage and harder farming. The lighter loams, that is where the stiff clay is from twelve to eighteen inches below the surface, require more care and attention and more fertilization to maintain their fertility. These lands are worth from $40 to $60 per acre, depending, partly, upon the texture and condition of the land and partly, of course, upon their position, nearness to the markets, and condition of the roads over which the crops have to be hauled. Lands situated directly on a first-class turnpike, and within easy hauling distance of a railroad station, may be worth much more than the figures given. Until very recently, these limestone soils were considered the most valuable in the State, and they readily brought from $60 to $200 an acre, and more, for grass, wheat and stock raising. At that time our light truck lands had merely a nominal value of from $1 to $5 per acre. With the changed condition of agriculture due to the greatly improved transportation facilities, grass, wheat and stock can be more cheaply raised in the West, and the value of these limestone lands has declined, while the value of the light truck lands has risen to a value which is comparable only with the former value of the limestone lands.

These limestone lands are admirably adapted, however, to the higher class of farming, in the production of the staple crops, stock raising, the fattening of cattle and the dairy interest. With good treatment thirty to forty bushels of wheat can be raised to the acre, and even more than this, and it is the very finest type of land for hay and pasturage. It may well

serve as a standard with which to compare the other soil formations of the State.

Next to the Trenton limestone, the soils derived from the disintegration of the Helderberg or mountain limestone are the strongest and most fertile grass and wheat lands in the State. There is only a small area of these lands in several narrow strips crossing the State, in Washington and Alleghany counties. The lands are rather high and rolling, and have excellent surface drainage; they are admirably adapted to grass and wheat.

These lands have about 40 per cent. of clay in the sub-soil, which is only slightly less than the heaviest Trenton limestone lands, and which is more adapted to corn than the lighter loam soils of the Trenton formation. This soil is nearly as close in texture and as retentive of moisture as the Trenton limestone, and there is not much difference in the yield of crops or in the general agricultural value of the lands.

The soils derived from the disintegration of the Catskill red sandstone in Garrett and Alleghany counties and from the triassic red sandstone forming the "red lands" of Carroll and Frederick counties, are so nearly alike in texture and in agricultural value that they may be described together. It has been estimated that there are about three hundred and twenty square miles of each of these formations in the State. The color of each is very characteristic, dark Indian red, with only a difference of a shade in the two soils. These lands have about 35 per cent. of clay in the sub-soil, which gives them good body and makes them very retentive of moisture and well adapted to grass, wheat and corn. In favorable seasons they are as productive as the Trenton limestone soils, but the crops are not as certain, for they are affected by unfavorable seasons.

The triassic red sandstone soils occur next to the limestone soils of the Frederick valley, and a close comparison is therefore possible between the two kinds of soil. In favorable seasons the yield of wheat on the "red lands" is about the same as on the adjacent limestone lands, but the crop is much more influenced by unfavorable seasons, and the soil itself will not stand the hard usage, and requires more careful treatment and rather more fertilization than the limestone lands; so while it is very productive it is not considered quite as safe nor as certain as the limestone soil. Like the limestone lands it is greatly benefited by an application of lime.

The soils derived from the disintegration of *gabbro*, forming the "red lands" of Cecil, Harford and Baltimore counties, of *gneiss*, forming the "gray lands" and "mica lands" of Cecil, Harford, Baltimore, Carroll, Howard and Montgomery counties, and of *phillite*, forming the wheat and corn lands of Harford, Carroll, Frederick, Howard and Montgomery

counties, are so similar in their texture and in their agricultural value that they may be described together.

These lands have about thirty per cent. of clay in the subsoil, and they are sufficiently retentive of moisture to make excellent wheat and corn lands and very fair grass lands. They may be considered in every way good average soils for general agriculture, being adapted to grass, wheat, corn and grazing and stock feeding and to the raising of vegetables for canning. They are too heavy in texture to compete with the light truck lands of southern Maryland in the production of vegetables for the early markets.

The "red lands" of the gabbro formation are rather stronger than the others, and as a consequence they are usually somewhat harder to work and require more labor to keep them in a good state of tilth. The gneiss lands are, as a rule, somewhat lighter in texture than the gabbro, and are better suited for the raising of corn and tomatoes for canning, which is such an extensive industry in Harford and the adjacent counties.

The average yield of wheat on these lands under good treatment is from twenty to thirty bushels per acre, although larger yields have been reported. The price of wheat has fallen so low in recent years that these yields per acre are hardly large enough to make the cultivation of this crop very profitable. While it is still a staple crop in these northern-central counties, it is being replaced to quite a large extent by other interests, especially the raising of tomatoes and corn for canning and by other special agricultural lines. While grass and the cereals will always be staple crops in this region, the lands are so well adapted to general agriculture, and the location is so favorable as regards the nearness of markets and transportation facilities that other special interests will undoubtedly be developed which will be much more profitable than the old staple crops. Agriculture is very conservative and its methods are slow, and it takes a long while for it to adjust itself to changed conditions in the industrial and commercial lines, but there are evidences to show that the farmers here are beginning to specialize and adjust their products to the demands or conditions of the market.

These are the most important soil formations of northern-central and western Maryland which have been carefully studied. There are other soils having either little agricultural value or which are adapted to special crops, which have not yet been sufficiently investigated. These may be briefly described.

In western Maryland there is a narrow belt of Cambrian sandstone devoted to the cultivation of mountain peaches, an interest which has recently grown to very large proportions. The soil is fine-grained, containing probably about thirty per cent. of clay. It is filled, however, with fragments of rock which are flat and look like pieces of shale. The

situation has much to do with the quality and color of the peaches. The most favorable situation is up on the mountain side where there is perfect surface drainage and a northern exposure, and a soil so stony that it is difficult to take a sample of any considerable depth. With this exposure the trees are insured against damage by early frost. In the adjacent valley, and with a southern exposure on the mountain side, vegetation is liable to be started by a warm spell in the winter and be suddenly checked and the fruit buds killed by frost in the spring. With the proper exposure, however, vegetation does not start until well into the spring, when danger of frost is over. There are, undoubtedly, other soils in the western part of the State as well adapted to peaches, and this industry will certainly spread. The soils appear almost identical with some of those derived from the Hudson River shales and from several of the mountain formations further west; and with the proper exposure as good results are being obtained further west as in this now celebrated region of the Cambrian sandstone around Pen-Mar, Edgemont and Smithsburg.

The very fertile soils of the Middletown valley have not been carefully studied, as the geology of this region has only very recently been worked out, giving a basis for the soil investigations.

There is a considerable area of the Hamilton and Chemung shales in western Maryland, but the rocks have not thoroughly disintegrated, and the soil is full of pieces of the shale, making it hard to work and rather unproductive for the staple crops. There are about 125 square miles of this formation, having the widest exposure about Hancock and on either side of the Polish Mountain. The Clinton and Niagara shales give very similar soils, but they occur only in very narrow ridges. These lands have about 40 per cent. of clay in the subsoil, which would give them a close texture and make them very strong and fertile lands but for the very large amount of boulders and fragments of shale making the land hard to cultivate. The lands are mostly in forest growth, or support but a scanty vegetation. They have good body, however, and are capable of being improved.

The Hudson river shales, in Washington county, are not naturally good wheat lands. They yield about 15 bushels of wheat to the acre under ordinary treatment, but they can be easily improved and made to yield more than this. The lands are rather light in texture, and they are not as strong nor as safe as the adjacent limestone lands, and they are probably much better adapted to fruit than to wheat, except for the danger from frost, which is liable to kill the buds. Lime is considered very beneficial to these lands. Many of the lands are filled with fragments of shale, and appear very similar in texture to the Cambrian sand-

stone, and they would probably make as good peach lands if the same exposure could be obtained.

The soils of the coal measures in the extreme western part of the State have not been worked out because there is no detailed geological work to base the soil work upon. These soils are derived from the disintegration of sandstones, shales and limestones, but the boundaries of these different formations have never been determined.

The other formations in western Maryland are mountainous, and occur only in narrow strips, and have little agricultural interest. In northern-central Maryland there are small areas derived from the disintegration of granite, which are altogether similar in texture and agricultural value to the gneiss soils.

The soils derived from the disintegration of serpentine are generally barren, but why they are so l as not been determined.

There are several narrow belts of soil derived from quartzite, which are of very limited extent and have not been studied.

In addition to these there are the light truck lands on the river necks, but these will be fully described in another place.

## SOILS OF SOUTHERN MARYLAND.

The strongest and most fertile soils of southern Maryland are in the diatomaceous horizon of the Chesapeake formation. This gives rise to three grades of soil—the lighter lands, having from 12 to 18 per cent. of clay in the subsoils, form the finest tobacco lands of southern Maryland; where the subsoils contain from 18 to 25 per cent. of clay they are well adapted to wheat; and where they contain from 25 to 35 per cent. of clay they are sufficiently strong for good grass lands. There has been no attempt as yet to determine the limit of these different soils, nor is it known exactly what the distribution depends on; whether they represent distinct horizons in the Chesapeake formation or whether it is due merely to local causes acting since the sedimentary material was deposited is not known.

The subsoil has a very characteristic yellow or reddish color. In many places the pure white diatomaceous earth can be seen underlying these lands at a depth of 2 or 3 feet, the yellow subsoil having been formed from the diatomaceous material by weathering. The yellow subsoil contains, as a rule, from 25 to 35 per cent. of clay, and where this comes within 8 or 10 inches of the surface it makes the soils very retentive of moisture and well adapted to grass and wheat. Where this subsoil is more than 12 inches from the surface and is overlain by a lighter loam, the lands are rather too light for grass, but are still well adapted to wheat. Where the loam is still lighter in texture, and has not over 18

per cent. of clay, it is too light for the profitable production of wheat, but is well adapted to tobacco.

The wheat lands of southern Maryland are lighter in texture than the wheat and grass lands of northern Maryland, and the average yield per acre is much less. It is said that these wheat lands have deteriorated in recent years for the lack of proper preparation and treatment of the land due to the scarcity and high price of labor, to the small yield and low price of wheat and to the fact that much of the land has been heavily mortgaged for the last twenty-five years.

It used to be the rule to apply lime every five years, and to depend on this and on clover to keep up the wheat land, but this rule is being neglected. There is little money to spend in fertilization; lime is more rarely used, if at all, and the lands are becoming clover-sick.

Wheat and tobacco are commonly grown on the same land, in rotation periods of two or three years. The best lands for wheat, however, are the heaviest clay lands, while the finest quality of tobacco is produced on the lighter loams. The heavy clay lands produce a larger yield of tobacco per acre, but the plant has a coarse, thick leaf, which is sappy, cures green and will not take on color. The finest grade of tobacco is produced on the lighter loam soils, which are rather too light for the profitable production of wheat. Tobacco produces a small yield per acre on these soils, but the leaf has a fine texture, and in curing it takes a good color and brings a much better price in the market. As a rule, the lighter the soil in texture, the finer the quality of tobacco produced, and the higher price it will bring per pound, but the less yield there will be per acre; so that there is a limit to the profitable production of the very finest grades on the very lightest lands, as the price is not sufficient to cover the small yield per acre.

The accompanying table gives the mechanical analyses of the subsoils of tobacco lands from a number of localities in southern Maryland:

MECHANICAL ANALYSES OF SUBSOILS FROM SOUTHERN MARYLAND, RATHER LIGHT FOR WHEAT, BUT THE FINEST TOBACCO LANDS.

| Diameter. | Conventional Names. | 266. | 258. | 164. | 260. | 262. | 162. |
|---|---|---|---|---|---|---|---|
| | | Chaneyville. | Marlboro. | North Keys. | Nottingham. | Chaneyville. | Marlboro. |
| *mm.* | | | | | | | |
| 2-1 | Gravel | 1.40 | 1.53 | 0.58 | 0.48 | 0.00 | 0.09 |
| 1-.5 | Coarse sand | 2.94 | 5.67 | 0.50 | 3.05 | 0.07 | 0.13 |
| .5-.25 | Medium sand | 11.23 | 18.25 | 1.35 | 12.08 | 1.56 | 0.58 |
| .25-.1 | Fine sand | 13.42 | 8.39 | 10.65 | 12.09 | 13.51 | 4.90 |
| .1-.05 | Very fine sand | 19.32 | 14.95 | 37.70 | 19.17 | 37.73 | 26.78 |
| .05-.01 | Silt | 17.59 | 28.86 | 22.00 | 23.09 | 18.82 | 33.12 |
| .01-.005 | Fine silt | 5.44 | 7.84 | 7.81 | 8.74 | 6.18 | 8.24 |
| .005-.0001 | Clay | 10.72 | 14.55 | 16.02 | 18.42 | 18.79 | 21.81 |
| | Total | 97.06 | 95.04 | 96.72 | 97.12 | 96.67 | 95.65 |
| Organic matter, water loss | | 2.94 | 4.96 | 3.28 | 2.88 | 4.33 | 4.33 |

| No. | Locality. | Clay. | Surface area. | Approximate number of grains per gram. |
|---|---|---|---|---|
| | | *Per Cent.* | *Sq. cm.* | |
| 266 | Chaneyville | 10.72 | 1.370 | 4,891,000,000 |
| 258 | Upper Marlboro. | 14.55 | 1.902 | 6,786,000,000 |
| 164 | North Keys | 16.02 | 2.016 | 7,338,000,000 |
| 260 | Nottingham | 18.42 | 2.126 | 8,263,000,000 |
| 262 | Chaneyville | 18.79 | 2.197 | 8,530,000,000 |
| 162 | Upper Marlboro | 21.81 | 2.638 | 10,065,000,000 |

The finest quality of tobacco is produced on the soils shown to have the smallest amount of clay and the smallest number of grains per gram in this table, while the heavier soils are much better for wheat and give a larger yield of tobacco per acre, but the quality of the tobacco is not so good, and it does not bring as good a market price. With the exception of 162, none of these soils would be considered very good wheat lands with the ordinary conditions of cultivation and manuring. They would be considered rather too light for the economical production of wheat. These lands are valued for wheat in proportion to the amount of clay contained in the subsoils, as shown in the table, but for tobacco the values are just reversed.

The strongest and best wheat lands appear to be confined to the diatomaceous earth horizon of the Neocene formation. The white diatomaceous earth can be found a few feet below the surface at all, or nearly all, the localities represented in the accompanying tables. The yellow clay of the wheat land appears to have been formed by the weathering of this earth, as in a number of railroad cuts and river bluffs they are seen to merge together; and in all cases where air has had access to the diatomaceous earth through cracks and root holes, a thin layer of the yellow clay has been formed. Diatoms are still found in most of these samples of the subsoils of the wheat and tobacco lands.

per cent. of clay, it is too light for the profitable production of wheat, but is well adapted to tobacco.

The wheat lands of southern Maryland are lighter in texture than the wheat and grass lands of northern Maryland, and the average yield per acre is much less. It is said that these wheat lands have deteriorated in recent years for the lack of proper preparation and treatment of the land due to the scarcity and high price of labor, to the small yield and low price of wheat and to the fact that much of the land has been heavily mortgaged for the last twenty-five years.

It used to be the rule to apply lime every five years, and to depend on this and on clover to keep up the wheat land, but this rule is being neglected. There is little money to spend in fertilization; lime is more rarely used, if at all, and the lands are becoming clover-sick.

Wheat and tobacco are commonly grown on the same land, in rotation periods of two or three years. The best lands for wheat, however, are the heaviest clay lands, while the finest quality of tobacco is produced on the lighter loams. The heavy clay lands produce a larger yield of tobacco per acre, but the plant has a coarse, thick leaf, which is sappy, cures green and will not take on color. The finest grade of tobacco is produced on the lighter loam soils, which are rather too light for the profitable production of wheat. Tobacco produces a small yield per acre on these soils, but the leaf has a fine texture, and in curing it takes a good color and brings a much better price in the market. As a rule, the lighter the soil in texture, the finer the quality of tobacco produced, and the higher price it will bring per pound, but the less yield there will be per acre; so that there is a limit to the profitable production of the very finest grades on the very lightest lands, as the price is not sufficient to cover the small yield per acre.

The accompanying table gives the mechanical analyses of the subsoils of tobacco lands from a number of localities in southern Maryland:

There are two classes of wheat lands. On the ridges and high plateaus, where washing has not occurred to any extent, the lands are rather light and loamy, the loam being usually from two to four feet thick and overlying the heavier clay. These lands are better for corn than the heavier lands, but are not so good for wheat, and are too light in texture for grass. Where the underlying clay is exposed, as in the gently rolling lands, it makes a much stronger and better wheat soil and a good grass land. The accompanying table gives the mechanical analyses of the subsoils from a number of localities representing very fairly the wheat lands of southern Maryland:

MECHANICAL ANALYSIS OF SUBSOILS OF WHEAT LANDS FROM SOUTHERN MARYLAND.

| Diameter | Conventional Names. | 250. Chaneyville, J. F. Talbott. | 248. Davidsonville, P. H. Israel. | 245. Davidsonville, opposite church. | 180. Plum Point. | 155. Upper Marlboro. | 246. ½ mile west of Davidsonville. | 141. Davidsonville, loam, T. S. Iglehart. | 252. South River. | 184. Pope's Creek. |
|---|---|---|---|---|---|---|---|---|---|---|
| *mm.* | | | | | | | | | | |
| 2–1 | Gravel | 0.00 | 0.00 | 0.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1–.5 | Coarse sand | 0.07 | 0.22 | 0.28 | 0.00 | 0.40 | 0.56 | 0.23 | 0.25 | 0.46 |
| .5–.25 | Medium sand | 0.98 | 3.76 | 0.98 | 0.48 | 0.57 | 31.26 | 1.71 | 0.30 | 6.61 |
| .25–.1 | Fine sand | 12.23 | 12.85 | 1.74 | 3.06 | 22.64 | 4.62 | 6.08 | 10.65 | 12.19 |
| .1–.05 | Very fine sand | 29.58 | 47.13 | 52.74 | 50.32 | 30.55 | 30.70 | 30.82 | 29.05 | 9.15 |
| .05–.01 | Silt | 23.19 | 13.89 | 16.91 | 14.19 | 13.98 | 26.16 | 20.92 | 22.45 | 30.89 |
| .01–.005 | Fine silt | 10.13 | 4.07 | 3.85 | 6.78 | 4.08 | 9.44 | 11.21 | 6.56 | 13.22 |
| .005–.0001 | Clay | 19.14 | 19.19 | 19.57 | 20.28 | 21.98 | 22.53 | 23.78 | 23.92 | 24.45 |
| | Total | 95.31 | 99.11 | 95.62 | 95.11 | 94.20 | 95.27 | 94.75 | 96.27 | 96.97 |
| Organic matter, water, loss | | 4.69 | 0.89 | 4.18 | 4.89 | 5.80 | 4.73 | 5.25 | 3.73 | 3.03 |

| No. | Locality. | Clay. | Surface area. | Approximate number of grains per gram. |
|---|---|---|---|---|
| | | *Per Cent.* | *Sq. cm.* | |
| 250 | Chaneyville | 19.14 | 2,453 | 8,918,000,000 |
| 248 | Davidsonville, P. H. Israel | 19.19 | 2,097 | 8,452,000,000 |
| 245 | Davidsonville | 19.57 | 2,214 | 8,917,000,000 |
| 180 | Plum Point | 20.28 | 2,380 | 9,357,000,000 |
| 155 | Upper Marlboro | 21.98 | 2,493 | 10,2[illegible]8,000,000 |
| 246 | ½ mile west of Davidsonville | 22.53 | 2,732 | 10,456,000,000 |
| 141 | Davidsonville, loam, T. S. Iglehart | 23.78 | 2,853 | 11,161,000,000 |
| 252 | South River | 23.92 | 2,681 | 10,983,000,000 |
| 184 | Pope's Creek | 24.45 | 2,847 | 11,202,000,000 |

These lands make fairly good wheat lands, but this is about the limit of profitable wheat production, and a soil having less than 20 per cent. of clay, or approximately 9,000,000,000 grains per gram, is too light in texture and not sufficiently retentive of moisture for the economical

production of wheat under the prevailing climatic conditions. This represents, however, merely the skeleton structure of the soil, and this could be so filled in and modified as to make it more retentive of moisture; but experience has shown that a soil lighter than this has not sufficient body to warrant the expense of converting it into a good wheat land. The soils are too light for grass. They are valued as wheat lands in about the order in which they are given in the table, except that it would seem that 245 should have been given a higher place in the table, as it is considered a very fertile wheat land; but this may have been due to the sampling.

The samples in the accompanying table are of strong wheat and grass lands of southern Maryland. They are considered the very finest type of wheat lands in that locality:

MECHANICAL ANALYSIS OF SUBSOILS OF STRONG WHEAT AND GRASS LANDS FROM SOUTHERN MARYLAND.

| DIAMETER. | CONVENTIONAL NAMES. | 142. Davidsonville, Clay. | 247. Davidsonville, James Iglehart. | 179. Herring Bay. |
|---|---|---|---|---|
| *mm.* | | 0.00 | 0.00 | 0.00 |
| 2-1 | Fine Gravel | 0.00 | 0.27 | 0.00 |
| 1-.5 | Coarse sand | 0.20 | 0.64 | 0.50 |
| .5-.25 | Medium sand | 2.43 | 3.20 | 3.50 |
| .25-.1 | Fine sand | 23.56 | 22.58 | 36.28 |
| .1-.05 | Very fine sand | 29.23 | 26.25 | 19.04 |
| .05-.01 | Silt | 6.36 | 10.42 | 6.78 |
| .01-.005 | Fine Silt | 32.45 | 32.40 | 32.42 |
| .005-.0001 | Clay | | | |
| | Total | 94.32 | 95.76 | 98.52 |
| Organic matter, water, loss. | | 5.68 | 4.24 | 1.48 |

| No. | LOCALITY. | Clay. | Surface Area. | Approximate number of grains per gram. |
|---|---|---|---|---|
| | | *Per Cent.* | *Sq. cm.* | |
| 142 | Davidsonville, clay, T. S. Iglehart | 32.45 | 3,604 | 15,148,000,000 |
| 247 | Davidsonville, James Iglehart | 32.40 | 3,537 | 14,903,000,000 |
| 179 | Herring Bay | 32.42 | 3,389 | 14,453,000,000 |

These samples were taken from very rolling lands where the loam, if it had ever accumulated, had been removed by washing, leaving exposed the yellow clay which seems to underlie all the wheat lands.

There is a very marked relation between the agricultural value of these lands and the texture and general appearance of the soils. If the soils are in a fair state of cultivation, in which the arrangement of the grains can be assumed to be sensibly the same, the agricultural value increases quite regularly with the percentage of clay and the approximate number of grains per gram. The yield increases, however, in nearly all

cases and with most crops, at the expense of the quality of the crop produced. In the case of tobacco and truck, as the quality or time of maturity is of more importance than the quantity of crop produced, the lands are valued, within certain limits, as the soil is lighter in texture and contains less clay and fewer grains per gram. It is not a matter of the chemical composition of the soil nor of the amount of available plant food in the soil which determines this local distribution of crops, but it is a matter of the texture of the soil, and especially of the relation of the soils to water and the amount of water which they can maintain for the crop under existing climatic conditions.

Lime has been considered the very best fertilizer for these wheat lands; but lime with plenty of organic matter in the soil "for the lime to act on," otherwise it will "burn out the land;" so that where the lime is applied, as it should be every few years, clover or some green manuring is considered a necessary adjunct. This combination of lime or organic matter would tend to make the soils more retentive of moisture.

The Marlboro, Davidsonville and West River districts have been famous for the excellent condition in which the lands have been maintained, and for the good farming which has prevailed. The value of the lands has, however, depreciated in recent years; labor is scarce and many of the farms are heavily mortgaged, so that good farming lands can be purchased very cheaply.

The farmers in this locality suffered severely as a result of the late war, and they have been unable to bear up under the burden of their debt. They have not yet adjusted themselves to these new and changed conditions of agriculture, nor adapted their farming to the present market demands.

A number of efforts have been made to introduce a different variety of tobacco into southern Maryland, as the type which has been raised there so successfully in the past meets with such wide competition in the increased production of this same grade of tobacco in other parts of the world. Efforts have been made to introduce the fine bright tobacco of North Carolina, but the soils selected for the experiments have been much heavier in texture, as shown by the mechanical analysis, than soils adapted to this grade of tobacco in the South. There are other soils, however, almost identical in texture with those in the South to be found in the Columbia and Lafayette formations which are probably well adapted to the production of these bright tobaccos. Experiments are to be tried on these lighter soils.

The accompanying table gives the analyses of the sub-soils from four localities of the fertile river terraces of southern Maryland:

MECHANICAL ANALYSIS OF SUBSOILS OF WHEAT LANDS.

*River Terrace.*

| Diameter. | Conventional Names. | 199. Benedict. | 201. St. Mary's. | 203. St. Mary's. | 205. Opposite St. Mary's. |
|---|---|---|---|---|---|
| *mm.* | | | | | |
| 2-1 | Fine gravel | 0.38 | 0.44 | 2.01 | 0.41 |
| .1-.5 | Coarse sand | 2.72 | 1.05 | 5.24 | 0.42 |
| .5-.25 | Medium sand | 11.64 | 2.67 | 1.75 | 1.64 |
| .25-.1 | Fine sand | 7.23 | 5.03 | 2.17 | 3.45 |
| .1-.05 | Very fine sand | 6.74 | 9.75 | 2.45 | 9.48 |
| .05-.01 | Silt | 33.92 | 34.82 | 37.21 | 41.88 |
| .01-.005 | Fine silt | 10.62 | 14.52 | 15.52 | 11.98 |
| .005-.0001 | Clay | 23.45 | 25.03 | 29.27 | 26.24 |
| | Total | 96.70 | 93.31 | 95.62 | 95.50 |
| Organic matter, water, loss | | 3.30 | 6.69 | 4.38 | 4.50 |

| No. | Locality. | Clay. | Surface Area. | Approximate number of grains per gram. |
|---|---|---|---|---|
| | | *Per Cent.* | *Sq. cm.* | |
| 199 | Benedict | 23.45 | 2,765 | 10,737,000,000 |
| 201 | Saint Mary's | 25.03 | 2,889 | 11,936,000,000 |
| 205 | Opposite Saint Mary's | 26.24 | 3,188 | 12,205,000,000 |
| 203 | Saint Mary's | 29.27 | 3,509 | 13,578,000,000 |

The river terraces border the Potomac and Patuxent rivers and their tributaries in the lower part of the peninsula, and are considered very strong wheat lands. They are classed geologically with the Columbia formation; but, as will be seen from the mechanical analyses, and as shown from the agricultural value of the lands, they are very much stronger soils than those of the same formation on the bay shore, which form the early truck lands between Baltimore and Annapolis. The terraces have an elevation of from twenty to sixty feet above tide, and are about half a mile wide, with the Lafayette formation rising beyond this into the pine barrens of the higher lands further inland. The terrace lands have good body, and are capable of a very high state of cultivation, and many of them are maintained in excellent condition. Some of the land around St. Mary's has been under cultivation for two hundred years without apparent deterioration, although there is nothing at all peculiar in the appearance of the land to indicate any unusual conditions. The soil is about six or eight inches deep, but neither the soil nor subsoil appears to have more organic matter than is usual in the lands of southern Maryland, nor do they appear different from the same class of lands elsewhere. They have been taken care of, and have been very intelligently handled.

There is a narrow strip of coarse, sandy soils bordering the Chesapeake Bay, from Baltimore down to South River, entirely devoted to the

production of early truck and vegetables for the Baltimore and the larger northern and western markets. This same character of soil is found on the Eastern Shore and along the Atlantic coast as far south as Florida, and it is very generally devoted to truck farming.

The sandy soils and subsoils of the early truck lands between Baltimore and Annapolis contain from four to ten per cent. of clay. Other things being equal, the lighter the soil, and the less clay it contains, the earlier the crop. Soils having over seven per cent. of clay are rather heavy for the earliest truck, but are well suited to tomatoes, cabbage, small fruits and peaches. Geologically, these light soils belong to the Columbia formation. A large part of this area is still lying out as a barren and unproductive waste for lack of proper facilities for transportation. This matter of cheap and quick transportation is so great a factor in the trucking interest, owing to the bulky and perishable nature of the market truck and small fruits, that lands directly on the water courses, or on the railroads, have a value many times greater than similar lands situated only a mile or two distant.

Peas, tomatoes, cabbage, sweet potatoes, watermelons, canteloupes, strawberries, raspberries and peaches may be grown, and are grown, with more or less success, on nearly all kinds of soil; but this area of sandy land in southern Maryland will produce these crops from one to three weeks earlier than the heavier wheat and grass lands in other parts of the State. This puts the truck into the Baltimore and northern markets much earlier than it can be produced on the heavier soils of the State, and insures the early truck farmers from competition from the State at large, and they get very fair prices, as their crops are sold before the market prices fall with the glut of summer vegetables. The trucking business requires a very heavy outlay for manuring and for labor, and everything depends upon the crop getting to market at the earliest possible date, to take advantage of the high prices; and no pains or expense is spared to force the maturity of the plant and hasten the ripening of the crop.

The early truck lands are much too light for the profitable production of wheat or corn, or of any of the staple crops whose period of growth extends into or through the summer months, not because the soils are deficient in plant food, but because they are so coarse and open in texture that they are unable to maintain a sufficient water supply for these crops during the hot spells which are liable to occur. It is not that these light, sandy lands produce as much yield per acre of the different kinds of market truck as the heavier lands that they are utilized for trucking, but that they ripen the crops earlier and so get advantage of the higher prices. There are, therefore, peculiar conditions desired in an early truck land, just the opposite conditions, indeed, from those required for

a good grass or wheat soil. The soil, or rather subsoil, of the truck lands should be very light in texture, containing not over ten per cent. of clay, and for the very earliest truck not over six per cent. If they have more than this the land is too retentive of moisture, and the growing period is prolonged and the ripening of the crop is delayed. In the truck land with less than six per cent. of clay the soil is drier and probably cooler, and these are conditions which would hasten the maturity of the crop.

Other things being equal, the more clay a soil contains the more retentive of moisture it will be, and the greater the amount of moisture which will be maintained in the soil for the crop. The fine particles of clay not only make the spaces within the soil exceedingly small, so that the rainfall must pass downward very slowly through the soil, but by increasing the area of the water-surface it increases the power the soil has of drawing water to the plant to supply the loss from evaporation and to replace that which has been used by the plant. In a heavy clay soil this supply of water may be so abundant as to prolong the growth of the plant and increase the size and yield per acre, but may greatly retard the ripening of the crop and make the texture coarse.

The average yield of wheat in Washington county is given by the census as eighteen bushels per acre, and this is principally from a limestone soil having over forty per cent. of clay. Wheat can not be economically produced on the light truck lands. It is not that the soils of Washington county contain necessarily more plant food than the truck lands of southern Maryland, but that having more clay the soils are stiffer and are more retentive of moisture, and they can maintain a more abundant supply of water for the crop.

These limestone soils are too retentive of moisture for early truck. In an average season they would maintain such an abundant supply of water that, although large crops would be assured, the crops would be late in coming to maturity, and would come into competition with crops from all parts of the State. The light character of the land, therefore, gives the early truck planter a monopoly of the market.

The mechanical analyses of the subsoils from a number of localities are given in the accompanying table, with the surface area and the approximate number of grains per gram, with such notes as may be necessary on the agricultural value of these lands:

MECHANICAL ANALYSIS OF TRUCK SUBSOILS FROM SOUTHERN MARYLAND.

*Marley Neck.*

| Diameter. | Conventional Names. | 471. Marley P. O. | 472. Marley P. O. | 591. 1 mile north of Marley P. O. | 469. Glen-burnie. | 473. Albert Ham-mond. | 590. 2 miles north of Marley P. O. |
|---|---|---|---|---|---|---|---|
| *mm.* | | | | | | | |
| 2–1 | Fine gravel | 0.28 | 0.49 | 0.39 | 3.47 | 0.44 | 0.91 |
| 1–.5 | Coarse sand | 5.42 | 4.96 | 5.52 | 12.05 | 6.46 | 5.45 |
| .5–.25 | Medium sand | 41.45 | 40.19 | 36.53 | 44.06 | 36.73 | 28.73 |
| .25–.1 | Fine sand | 26.73 | 27.59 | 24.91 | 18.02 | 19.54 | 22.81 |
| .1–.05 | Very fine sand | 12.46 | 12.10 | 11.79 | 9.59 | 10.28 | 13.44 |
| .05–.01 | Silt | 7.22 | 7.74 | 9.89 | 5.73 | 13.42 | 14.77 |
| .01–.005 | Fine silt | 2.21 | 2.23 | 4.51 | 1.37 | 5.61 | 4.29 |
| .005–.0001 | Clay | 4.07 | 4.40 | 5.41 | 5.46 | 7.14 | 9.16 |
| | Total | 99.84 | 99.70 | 98.95 | 99.75 | 99.62 | 99.56 |
| Organic matter, water, loss | | 0.16 | 0.30 | 1.05 | 0.25 | 0.38 | 0.44 |

| No. | Locality. | Clay. | Surface area. | Approximate number of grains per gram. |
|---|---|---|---|---|
| | | *Per Cent.* | *Sq. cm.* | |
| 471 | Marley P. O | 4.07 | 583 | 1,809,000,000 |
| 472 | ......do | 4.40 | 615 | 1,955,000,000 |
| 591 | 1 mile north of Marley P. O | 5.41 | 796 | 2,458,000,000 |
| 469 | Glenburnie | 5.46 | 654 | 2,406,000,000 |
| 473 | Albert Hammond | 7.14 | 987 | 3,215,000,000 |
| 590 | 2 miles north of Marley P. O | 9.16 | 1,173 | 4,078,000,000 |

These soils from Marley Neck represent fairly well the early truck lands along the bay shore. Those lands having less than 6 per cent. of clay, as shown by the table, are considered very typical early truck lands; soils having 6 per cent. of clay are considered rather heavy for the very early truck, but are excellent for small fruits. Tomatoes, for example, will ripen a week earlier on land having 4 to 5 per cent. of clay than on lands having 8 or 9 per cent. of clay. Tomatoes and cabbage do better and yield more per acre on the heavier lands; but they are not so early, and consequently do not bring as good prices as the crops from the lighter soils. Time is everything to the early truck plants; and these light lands have some peculiar property which adapts them to this early truck and matures the crops earlier than on any other soils of the State. The loam soils are much better adapted to the small fruits and peaches than the very light lands.

These truck lands appear to be remarkably uniform in texture, and the slight differences which appear in the percentage of clay and in the approximate number of grains per gram are very sharply defined in the agricultural value and importance of the land. The soils having the lowest percentage of clay and the least number of grains per gram are, with the exception of those directly on the Bay shore at the end of the

river necks, invariably regarded as the earliest truck lands, and one can readily tell from the general appearance and texture of the soil to what class of land the sample belongs. The light soils mature the crop earlier, but the heavier loam soils produce a larger yield per acre and generally a better development, and would be considered naturally stronger soils.

These soils are too light for the profitable production of the staple crops, as the yield per acre would be extremely small and they could not compete with the stronger and heavier soils from other parts of the State and of the country. Their peculiar value lies in the fact that they can produce during the spring and early summer small fruits and vegetables earlier than they can be produced in other parts of the State, so that they have the advantage of good market prices. The reason of this is undoubtedly due to the physical structure of these soils, especially to the relation of the soils to water. It cannot be due directly to the amount of available plant food they contain, for no addition of mere plant food would make these soils as strong and productive as a limestone soil unless the whole texture of the land was changed.

A few years ago these light, sandy lands had hardly any market value, as they would not produce any of the staple crops economically. Since the introduction of truck farming, however, these have become the most valuable lands in the State. Lands situated close to the river or along a line of railroad where good transportation facilities are offered are worth from $50 to $200 per acre, and even more; but where these transportation facilities are lacking the very finest truck lands are still lying idle, and can be purchased for a merely nominal sum of from $1 to $5 per acre. As the country is developed and transportation facilities are offered, and when methods of packing and transportation are improved, these lands will become of great value.

The Lafayette formation, covering a large area in southern Maryland, forming what are known as the pine barrens, have, as a rule, very coarse, sandy soils, containing less than five per cent. of clay in the subsoil. These lands are so coarse and open in texture that they have little agricultural value under existing conditions. They are, however, admirably adapted to very early truck, and when the country is opened up and transportation facilities are provided these will be among the most valuable lands in the State. Many of these lands also have the same texture as the fine, bright tobacco lands of North Carolina, and they are adapted to some of the fancy grades of the bright tobacco.

Of the other soil formations in southern Maryland the Eocene and Cretaceous formations have about the same texture and agricultural value. They contain from eight to fifteen per cent. of clay in the subsoil and are well adapted to fruit, truck and tobacco. There is comparatively

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a small area of these formations in this part of the State, and they are, therefore, of very little agricultural importance.

Several lines of railroad are projected through this region, and when proper transportation facilities are provided, the whole of southern Maryland is admirably adapted to fruit, truck, tobacco and the dairy interests, where the lands are sufficiently strong to maintain pastures and raise forage for stock.

The Potomac formation, crossing the State from Washington through Baltimore to the Delaware line, is of little present agricultural value. The prevailing soils are stiff clays of variegated colors. They contain from forty to fifty per cent. of clay and should be very strong and fertile lands, as productive as the Trenton limestone soils. As it is, they have little agricultural value, and much of the land is lying out as a barren waste. The reason for this is probably to be found in the arrangement of the grains of sand and clay, as the clays have the effect of being puddled and are nearly impervious to water. By proper treatment these lands can undoubtedly be improved and be made highly productive. The requirements in the improvement of these lands are that they should be properly under-drained and then such methods, fertilizers and crops be used as would tend to make the soils more loamy so that moisture can circulate through them more freely.

### SOILS OF THE EASTERN SHORE.

The geology of the Eastern Shore has not been worked out in sufficient detail to give a basis for these soil investigations. The boundaries of several of the formations have not been determined, and some of the formations have not even been identified, so that very little work has been done as yet on the soils.

There are four principal soil formations in this region. The strong and fertile wheat and corn lands of Queen Anne and Talbot counties, which are probably formed directly of the Chesapeake formation, are similar to the strongest wheat lands of southern Maryland, which have already been described. These lands have a stiff yellow clay subsoil, with about the same texture as the gabbro, gneiss and phillite lands of northern-central Maryland. The lands are very level, but have good underdrainage. The fields are large and perfectly level, making the cultivation extremely easy. Wheat is grown on the heaviest lands, and corn and fruit are grown on the lighter loam soils. There is a prevailing impression that grass cannot be grown on these lands, and there is certainly very little permanent pasture or sod land. This is probably due to the fact that wheat has been raised on these lands continuously. Wheat and corn have been *the* staple crops in the past on these heavy lands. There are some pastures, however, which have been unbroken

for twenty or thirty years, and they are as strong and as fine now as any of the grass lands of northern Maryland could maintain. This shows the possibility of these soils, if attention could be generally directed in the proper channel.

The Eocene soils of Kent county have not been studied as yet.

In Dorchester and the lower counties of the Eastern Shore, the wheat lands are of a different character from those in Queen Anne and Talbot. The subsoil is a white or grayish clay, and is very close, and very retentive of moisture. These lands need underdrainage. They should have a very high agricultural value, but, as a matter of fact, they are too close and too retentive of moisture for wheat. Before the war, when there was an abundance of labor, these lands were kept in admirable condition, and they were exceedingly fertile. There are still some farms kept up to the very highest condition of cultivation, and these show that the lands, when properly cared for, are admirably adapted to wheat and grass.

It has not been determined whether the white clay, forming the subsoil of these wheat lands, belongs to the Chesapeake formation, or, as seems rather more probable, to a later formation, probably the Lafayette, or possibly a horizon of the Columbia.

There are large areas of light sandy lands of the Columbia formation overlying the stiff clays, varying in depth from a few inches to a number of feet. These form the early truck and fruit lands of the Eastern Shore. They appear to be identical with the early truck lands of the Columbia formation of southern Maryland, which have been already described. The areas of this formation have not been outlined. These light sandy lands occur in Kent county, cover nearly the whole of Caroline county, and there are wide areas in Dorchester, Wicomico, Somerset and Worcester. These lands are admirably adapted to early truck and fruit, but, as has been shown, this interest has only existed as a separate industry within recent years, and there are large tracts of these lands which have not yet been developed, but which are lying out as barren wastes. The admirable railroad and water facilities for shipping truck, however, make it certain that the present rapid development of the trucking and fruit interest will continue, and that these lands will be taken up in a short time, and applied to the purposes for which they are so well adapted.

## LIVE STOCK.

The principal agricultural regions of the State have been already described in some detail, and it remains now only to speak of some special features which have a bearing on the breeding and raising of live stock.

Two elements of paramount importance in stock-raising are an abundance of food and a plentiful supply of good water. These two conditions are found in the northern and western parts of the State, where the lands are admirably suited to grass, wheat and corn. The blue grass on the limestone soils in several of the counties is particularly tender and succulent, and is considered by many to be even more nutritious than that of Kentucky. Cecil county is especially noted for the excellency of its timothy, and in all these counties mixed hay of a good quality is produced, as well as an excellent quality of grain and straw and fodder in great abundance. Skim milk can be obtained in the neighborhood of the creameries for feeding hogs.

These lands, which have a rolling surface, are abundantly watered, as it is rare to find a field of considerable size which has not a spring or a stream of pure water. Such streams, flowing through pastures, add greatly to the value of the land for stock-raising.

The proximity to the ocean and bay makes the climate of the State more uniform and exempts it from the extremes of temperature so common in the far West, while the hills and mountains mitigate the severity of blizzards.

The southern part of the State is less abundant in pasturage and water and is not so well adapted to general stock-raising; though there are regions more favored in these respects, and years ago Southern Maryland was famous for the attention given to breeding fast horses. This was especially the case before the late war. There were then no railroads and all local traveling was done by riding or driving. Fox hunting, races and tournaments were the principal amusements, and the young men especially took great pride in their horses. Horse-breeding was not then as now pursued as a gainful business, but as a luxury or necessity. Under the changed agricultural conditions this interest has greatly declined. Nevertheless, more than one owner of valuable stock has lately selected these southern counties to establish stables. While the country is flat, and hills are rarely seen, it is very well wooded and the woods afford protection to the stock in winter; while, from the neighborhood of the bay and ocean, the climate has an almost insular mildness. The innumerable estuaries, river-mouths and salt marshes, which extend all along the Southern Atlantic and Gulf coasts, are very favorable for cattle-ranges, though the lack of pasturage and running streams operates as a disadvantage.

*Statistics*. The census statistics of cattle, sheep and hogs for 1890 have not yet been issued; but the following statistics of horses, mules and asses are taken from Bulletin No. 103, issued August 19, 1891. These statistics are confined to farms of over three acres, thus excluding the animals in towns and cities as well as those on smaller holdings:

On June 1, 1890, there were on these farms 130,395 horses, 14,064 mules and 97 asses. In 1860 the number of horses was 93,406. The decrease in horses on farms from 1860 to 1870 amounted to 3.97 per cent., being much less than in many of the other Southern States. From 1870 to 1880 there was an increase of 31.33 per cent., and from 1880 to 1890 an increase of 10.70 per cent. There were 9,829 mules and asses in 1860 and about the same number in 1870; and in these there was an increase from 1870 to 1880 of 27.78 per cent., and from 1880 to 1870 of 12.74 per cent. There were foaled in 1889 11,855 horses, 209 mules and 32 asses, and in the same year 7,296 horses, 831 mules and 26 asses were sold and 6,088 horses, mules and asses died.

*Breeds of Horses*. It would hardly be an exaggeration to say that greater progress has been made during the past fifteen years in the improvement of horses, and in the past twenty or twenty-five years in the improvement of all kinds of stock, than had been made in the previous century. Nevertheless, impartial judges see that with this great improvement in recent years there have been some heavy losses which are to be deplored. With horses, speed has been the great end and object of improved breeding. A horse that can make a mile, or even a half or a quarter of a mile dash in the shortest time wins the premium and the applause of the multitude. The constitution and the endurance of the animals are altogether secondary considerations, and these most valuable qualities have been greatly impaired in the development of the modern race-horses. With cows, likewise, the improvement has been, until recently, in the line of great yields of butter for relatively short periods with high feeding. This reached its height in the recent Jersey craze, when these animals brought immense prices, but were so delicate and sensitive that they had to be tended as carefully as one would care for a child. When the fancy for Jersey cattle declined many breeders were financially crippled, but it has had good results for the live stock interest, as this has taken a healthier turn now, and constitution, endurance and general utility are more carefully considered. With cattle the tide is already turning toward the development of the most generally useful and valuable qualities. With horses the tide has hardly yet turned, and speed is still bred for with very little regard to constitution or endurance.

Maryland was famous for its horses in colonial days, and, indeed, until about fifty years ago. This was due to the social life of the times, espec-

ially in southern Maryland and the Eastern Shore, where slavery prevailed, and where the people were dependent for their exercise, pleasure and social intercourse upon their horses. Besides this, liberal premiums were offered by our people from pure love of the animal and the interest in its development. With the changed conditions of agriculture, however, this interest declined, and when the scientific improvement of live stock was introduced fifteen or twenty years ago the high quality of animals once found here was almost a thing of the past. It is a history common to all the Southern States where the peculiar conditions incident to slavery prevailed; and nearly all the older States which have felt the recent changes in agricultural conditions have experienced this period of depression, to which they are only now adjusting themselves. It is true that the live stock interest is in a healthier state, and very marked improvements have been made in recent years as a direct result of the depression fifteen or twenty years ago.

*Thoroughbreds* (*Running Horses*). The breeding of thoroughbreds in the State has, with a few exceptions, been spasmodic and without any particularly good results. This failure has been justly attributed to the lack of scientific methods with the breeders themselves. The excellent results which a few breeders are attaining illustrate the value of the most advanced methods. One establishment in this State for the breeding, rearing and training of thoroughbreds was started only a few years ago, but has already attracted the attention of the racing fraternity, at least, throughout the Eastern States. The stock at this farm ranks with the very best in the country, and the successes attained from early development have not been excelled even by California, which has so long boasted of its early developments. The horses on this farm are valued at nearly a quarter of a million of dollars; the purses won in a single season have exceeeded $100,000. The expenses incident to the breeding and training on such a large scale are very great, but the profits accruing have made the enterprise very remunerative.

*Standardbred or Light Harness Horses.* It is in this class that the greatest improvements have been attained. Indeed, more horses of this class can be found to-day on the road than were to be found ten years ago in the training stables. This industry of the breeding of trotters and pacers has been remarkable in its recent development, and it is not confined to any part of the State. A single county now produces more standardbred horses than were produced in the whole State a few years ago, and there are only a few counties in the State where the breeding of this class of horses is not established as a business. So general and widespread has the industry become that a breeders' association was established about three years ago, and this association is able to give from their own stables a race meeting each fall, lasting several days.

Many of the larger stock farms have private tracks where the animals are trained. The market for these horses has extended into all parts of the United States, and the growing demand for fast light-harness horses abroad has been the means of extending the market to foreign countries.

Stallions of unblemished ancestry are to be found in abundance in the State, and even if they are not bred to mares of equally high pedigree, yet good results are obtained in the general improvement of the progeny; and the importation of brood mares of good breeds is tending further to raise the quality of this class of horses.

*Coach Horses.* Unfortunately very little attention has so far been paid to the breeding of this very useful and profitable class. The stallions of this class now in the State are of the "French Coach" and "Cleveland Bay" variety. One or two good stallions have recently been imported into the State, and good results are expected within the next few years. The appreciation and demand for this breed is increasing every year.

*Draught Horses.* Much more attention has been paid to this class of horses, largely through the influence of a public-spirited citizen of Baltimore, whose importations of Percherons of fine quality have led to a more thorough appreciation of this class. A number of Clyde stallions have also been imported, and these have given a good class, though a limited number, of grade animals.

*General Utility Horses.* The main dependence of an agricultural region is the general utility horse, which can be used for all kinds of work. It seems rather strange that with the natural advantages of the State, our farmers have been slow in giving proper attention to this class of animals. The mare that works in the plow all the week and pulls the family to church on Sunday is bred to this or that horse either because the fee is small or because he had once trotted a fast mile. The results of such breeding are far from satisfactory. This is beginning to receive the attention it deserves, and certainly there is no more important subject for the farmer to consider.

While there may be some grounds for pride in the fact that the trotter has been developed in this country to a degree of speed never dreamed of a few years ago, we must not forget that he is scarcely more of what may be termed a general utility horse than is a thoroughbred. The trotter is bred for speed, and to such a degree has this specialization been carried, that unfortunately the qualities of endurance, conformation and action have been neglected and impared to a very great extent. Even our farmers have been imbued with this craze for speed. As a rule, and under the average conditions of farm life, there is no more chance of obtaining a great winner than there is of drawing a capital prize in a lottery. Our farmers are now beginning to perceive this, and that for

sure and substantial profits in breeding, the animals must have bone, muscle, power and constitution, combined with a moderate amount of speed, and with sufficient nervous energy to enable them to stand long trips with some weight behind them.

The Hackney horse seems to fill this want very well, and there is cause of congratulation that a worthy son of the great Confidence has been added to the list of breeding stallions in the State. It is to be hoped that more of this class of horses may be introduced into the State, for it is believed that by judicious crossing of trotting and thoroughbred mares, a good class of light and heavy-harness roadsters may be obtained.

*Mules.* Although there is a steady and a growing demand for these valuable animals, at good prices, they are rarely foaled in this State, but are usually brought from the West. The reason for this is on account of the scarcity and high price of jacks, a good Spanish jack being worth from $1,500 to $3,000.

*Cattle.* Fifteen years ago some of the finest herds of Jersey cattle in the country were owned in Maryland, and about that time there was an exhibit of Jersey cattle at the State Fair, which was probably as fine as could have been found elsewhere in the country. The craze for Jerseys, born of the fictitious values, broke suddenly, and many breeders lost heavily. The herds were broken up, and have been scattered through the State and elsewhere. This has been followed by a much healthier condition, and a system of grading has resulted from this decline in value of the thoroughbred Jerseys, much to the advantage of the State at large. The breeders now consider the endurance and constitution of the animals, rather than their performances under artificial conditions for limited and very short periods of time.

The introduction of the Holstein-Friesian cattle was made upon this more stable basis, and a large number of these cattle are found in different parts of the State and they are looked upon with great and increasing favor. A few herds of thoroughbred Herefords are owned in Baltimore county and on the Eastern Shore. In the western part of the State some Durhams of excellent quality are bred. It was considered, by many experts, that, at one time, the finest herd of Durham cattle in the world was owned in Maryland, but the death of the owner caused the herd to be broken up, and the good effects of the sale are apparent in the improved breeding of the stock in that section of the State. Short-Horns are still bred in the western counties, mainly because oxen are used for hauling, and because large animals are desired for beef.

*Sheep.* The sheep interest has always been in a very healthy condition in this State. Probably a majority of the farms support flocks of sheep, and the interest is growing. The Southdowns have been a favorite

breed, and the fine flock at Druid Hill Park, in Baltimore, has done much to awaken an interest in the improved breeds.

Sheep require very little care, and have to be housed and fed, at most, not over two months in the year; the remainder of the time they run at large in the pasture fields and in the corn and stubble fields, after the crops are removed. They yield a handsome return for the small amount of care and expense they are to the farmer.

*Hogs.* Previous to 1875 the Chester-White, crossed with the White-China, was the favorite breed of hogs; but about that time the scientific breeding of Berkshires was begun, and this is undoubtedly at present the favorite breed of hogs. For years Maryland possessed what was probably the finest herd of Berkshires in the United States or England. The herd still contains its finest blood, although it is considerably reduced in numbers. There are a number of herds of this breed in the State, many of them of the finest blood, as also a few herds of Poland-China, Small-Yorkshires, and some Jersey-Reds.

# CHAPTER VI.

## NATURAL HISTORY.

### THE FLORA OF MARYLAND.

Any attempt to give an account of the flora of Maryland must of necessity prove unsatisfactory. No botanical survey of the area included within her limits has ever been made, and in the absence of the information which such a survey would afford, much that would be of great interest and utility must be omitted and general statements must take the place of exact details. It is not probable that many plants new to botany would be brought to light, since there are no such sharp botanical lines between neighboring States as would lead us to expect plants in one not found in others close at hand; but many plants known elsewhere, but not previously reported in Maryland, would doubtless be found, and the distribution of the different genera and species would be ascertained, together with their relations to soil and climate. Not only has there been no general survey, but little has been published of the work done by individuals. Dr. William E. A. Aikin prepared a catalogue of the "Phænogamous Plants and Ferns" growing in the vicinity of Baltimore, which was published in the Transactions of the Maryland Academy of Science and Literature in 1837, but has long been out of print. Mr. Howard Shriver published a list of plants collected near Cumberland, and the present writer published, in 1888, a preliminary check list for the vicinity of Baltimore, in which the work of Dr. Aikin was freely used.

### BOTANICAL REGIONS.

The State of Maryland has three distinct geological regions which will serve also as the botanical divisions: the Coastal Plain, the Piedmont Plateau and the Appalachian Mountains. A somewhat irregular line from Havre de Grace through Baltimore to Washington divides the ten thousand square miles of land area into two nearly equal portions. The Coastal Plain lying to the east of this line is characterized by a comparatively level surface of little elevation, the fresh water streams having a more or less sluggish current and a tendency to spread out into marshes. It is divided into two portions by the Chesapeake bay, and each portion is much sub-divided by rivers or rather arms of the bay, up which tides advance. Many plants find here alone the conditions

necessary to their existence. Shore plants, plants growing in deep water, salt marsh plants, and plants requiring wet sandy soil, may be mentioned as peculiar to this region. The Piedmont Plateau extends from the Coastal Plain to the base of the Catoctin Mountains, and has an elevation of from two to nine hundred feet above sea level. The surface is rolling or hilly, and the streams have generally a more rapid current. This section is less peculiar in its vegetation. Rich woods and meadows covered with a rank herbaceous growth are characteristic. The western portion of the State consists of mountains and intervening valleys. The streams to the east of Little Savage Mountain flow into the Potomac, while those to the west seek the waters of the Ohio. The plants peculiar to this region are principally such as find their way thus far south only along the mountains; though many plants found sparsely in the Piedmont Region are here much more numerous and grow more luxuriantly, giving the general aspect of vegetation a character of its own. A striking feature of this part of the State are the Glades, upland meadows, believed to be the basins of former shallow mountain lakes. The State Geologist in 1841 thus describes them: "These are natural meadows of variable extent, with a deep mould for soil, apparently in its origin produced by the decomposition of a red, shaly sandstone, to which time has added a rich accumulation of decayed and decaying vegetable matter. This soil throws up a spontaneous growth of succulent grasses and plants that afford the finest and most abundant pasturage for cattle during a long portion of the year, and in the months of June and July present to the eye of a traveler who crosses them a delightful parterre composed of flowers of all hues, over which the botanist would be rejoiced to roam among old and, perhaps, new acquaintances. The whole extent of these glades within the limits of Allegany county may be estimated at about twelve thousand acres, the greatest portion of which, east of the Yohogany, is located towards the summit of the dividing mountains. They are not connected with each other, and their outlines are very irregular, spurs and ridges intersecting them and knolls sometimes rising up from amidst them."

This great variety in land surface has given rise to a great variety in vegetation. Some plants are to be found only on certain rock formations to which they have become specially adapted. An example of this is found in Talinum teretifolium, Pursh. This plant grows on almost naked serpentine rocks, which become at times extremely dry. Its cylindrical leaves enable it to store up water as a supply in time of need, and it continues blossoming and ripening its seed during the severest drought. Several specimens were placed in a tin pan, without earth and unwatered, to experiment upon its endurance in this respect. They continued to bloom from day to day for the space of two weeks, when the experiment was interrupted.

## CLIMATE.

The mean temperature of Baltimore for the past twenty-one years was 55.3°, the extreme range during that period being from—6° on January 1, 1881, to 102° on July 18, 1887. The winters differ much in severity, giving rise to a longer or shorter flowering season. December, January and February are generally without flowers, except witch-hazel, which blooms in December, and winter is occasionally prolonged to the end of March. The mildest winter of which there is any exact record was that of 1889-90. The mean temperatures for five months were: November, 48°; December, 46°; January, 44°; February, 43½°; March, 42°. The ranges for the same months were: November, 70° to 28°; December, 73° to 23°; January, 73° to 20°; February, 74° to 23°; March, 77° to 12°. In this extraordinary season fall ended, as regards flowers, about the first week of January, while spring began the last week of December, the seasons completely overlapping. Twenty-six species were found blooming between December 25 and February 16, viz:

I. Summer or fall plants in bloom much later than usual:
- Aster prenanthoides, Muhl. Dec. 25, Jan. 3.
- Lepidium Virginicum, L. (Peppergrass). Dec. 25.
- Achillea Millefolium, L. (Yarrow). Jan. 3.
- Chrysanthemum Leucanthemum, L. (Ox-eye Daisy). Dec. 25, Jan. 3.

II. Spring plants in bloom much earlier than usual:
- Hepatica triloba, Chaix. Dec. 25, Jan. 5, Feb. 16.
- Cerastium vulgatum, L. (Mouse-ear Chickweed). Dec. 25, Feb. 16.
- Symplocarpus foetidus, Salisb. (Skunk Cabbage). Dec. 25.
- Corylus Americana, Walt. (Wild Hazel-nut). Jan. 3, Feb. 16.
- Antennaria plantaginifolia, Hook. (Plaintain leaved everlasting). Jan. 3, Feb. 16.
- Acer dasycarpum, Ehrh. (White Maple). Jan. 4.
- Viola palmata, L. var. cucullata, Gray. (Common Blue Violets). Jan. 4.
- Nasturtium officinale, R. Br. (Water-cress). Jan. 4.
- Houstonia cærulea, L. (Bluets). Jan. 4, Feb. 16.
- Alnus serrulata, Willd. (Alder). Jan. 5, Feb. 16.
- Acer rubrum, L. (Red Maple). Feb. 16.
- Ulmus Americana, L. (American Elm). Feb. 16.
- Luzula campestre, DC. (Wood Rush). Feb. 16.
- Salix Babylonica, Tourn. (Weeping Willow). Feb. 16.
- Poa flexuosa, Muhl. (Spear Grass). Feb. 16.

III. Plants blooming usually in spring, summer and fall:

Stellaria media, Smith. (Common Chickweed). All dates.

Poa annua, L. (Low Spear-grass). All dates.

Capsella Bursa-pastoris, Moench. (Shepherd's Purse). All dates.

Malva rotundifolia, L. (Common Mallow). Dec. 25, Jan. 5.

Taraxacum officinale, Weber. (Dandelion). Dec. 25, Jan. 5.

Draba verna, L. (Whitlow Grass). All dates.

Lamium amplexicaule, L. Jan. 4.

The seven last mentioned are hardy, naturalized plants from Europe, and two of them, Stellaria media and Draba verna, may often be found in bloom after a few warm days during the winter months.

The rose, Pyrus Japonica and English daisy were blooming in parks and gardens in the last week of December. The peach trees bloomed in February, and suffered severely from the cold weather of March. On the whole, the season was very unfavorable for fruit.

### FORESTS AND FOREST TREES.

The first settlers of Maryland found a land having a great abundance of grass on the plains and in the open fields, but for the most part thickly wooded. "Fine groves of trees appear," says Father White, "not choked with briers or bushes and undergrowth, but growing at intervals as if planted by the hand of man, so that you can drive a four-horse carriage wherever you choose through the midst of the trees." The many hickories, the oaks, "so straight and tall that beams sixty feet long and two and a half feet wide can be made of them," the cypress trees growing to a height of eighty feet before they have any branches, and with trunks that three men with arms extended could barely reach round, excited the wonder of the colonists. As late as 1841, Prof. J. T. Ducatel, State Geologist, describes the aspect of the country from the mountain tops in Allegany, then the westernmost county of the State, as "at first grand and imposing, but the eye is soon gratified, as it rests upon apparently interminable forest." "The crests and flanks of the mountains are covered principally with pines and chestnuts. The yellow and spruce pines are most abundant of that species of timber in this section of the county; the white pine occurring only in few places. On the bottom lands are found nearly all the most valuable forest trees; oaks, walnut, poplar, locust, hickory, the Magnolia acuminata, or cucumber tree as it is here called, and the maples, among which is the sugar maples, which beautifully overshadows extensive camps, whence the smaller farmers of the county, and indeed most of the inhabitants, are supplied with sugar. The lime tree (Tilia glabra), here called linn, is also conspicuous amidst the larger trees of these forests. Among the flowering shubbery are

particularly noticed the mountain laurel (Rhododendron maximum), calico bush (Kalmia latifolia) and the wild honeysuckle (Azalea viscosa) of large size, bearing a cluster of white flowers that emit a delicious fragrance."

The agricultural development of the land, and the demands of commerce, have affected the flora to a very great extent, but Maryland may still be considered as well wooded. Trees deserve especial attention, not only because they are most conspicuous, among the most beautiful, and the most useful of vegetable growths, but because of their great importance in distributing the rainfall and in modifying the climate. While on the one hand the healthfulness of a country in our latitude may be increased by clearing away part of the originally almost unbroken forest, on the other hand, destructive torrents, and equally destructive droughts are the consequences of too great denudation of trees.

Maryland, it is believed, is still in most parts, on the safe side, and, if proper attention be paid to the preservation of forests in those regions which are not adapted to agriculture, this will continue to be the case. The continually increasing demand for wood, and the destructive manner of obtaining what is merchantable, so generally employed, as well as the ravages of fires, due to accident or carelessness, render it advisable to take precautionary measures. This may the more easily be done, since forest culture, or forest preservation, in the many hilly or mountainous regions which can be turned to no other use, would be sure to pay handsomely in time, owing to the increased price which forest products are certain to bring in the future. The natural forests of the country cannot long withstand the destruction now going on, and the application of scientific principles to forest growing in this State, would not only render much otherwise useless land wealth-producing itself, but would be a means of preserving the agricultural lands against the evils resulting from a deficiency of trees.

In number of species, and probably in number of individuals, the oaks rank first among our native trees. The white oak (Quercus alba, L.), post oak (Q. stellata, Wang.) and swamp white oak (Q. bicolor, Willd.), resemble each other in general appearance, and in their hard and durable wood, which is used in making agricultural implements and carriages, for railroad ties and fence posts.

The laurel oak (Q. imbricaria, Michx.) is used for shingles; the pin oak (Q. palustris, Du Roi) for planks; the bark of Spanish oak (Q. falcata, Michx.), of chestnut oak (Q. Prinus, L.) and of black oak (Q. coccinea, Wang., var. tinctoria) is used in tanning; the wood of black oak is used by coopers and carriage-makers; all the above, together with water oak (Q. aquatica, Walter), black jack (Q. nigra, L.), willow oak (Q. Phellos, L.) and black scrub oak (Q. ilicifolia, Wang.) make good fuel.

Of four or five species of hickory, the shag-bark (Carya alba, Nutt.) furnishes the most valuable wood, tough, elastic and durable. Pines fit for lumber have become scarce, but specimens of white (Pinus Strobus, L.) and yellow pine (P. mitis, Michx.) may still be found. Pitch pine (P. rigida, Mill.) and Jersey scrub pine (Pinops, Ait.) are plentiful, but valuable only as fuel.

From the wood of the cucumber tree (Magnolia acuminata, L.) pumps and bowls are made; the yellow poplar (Liriodendron Tulipifera, L.), a local name brought down from early colonial days for the tree elsewhere known as tulip tree, white (Acer dasycarpum, Ehrh.), red (A. rubrum, L.), and sugar maple (A. saccharinum, Wang.) common locust (Robinia Pseudacacia, L.), chestnut (Castanea sativa, Mill., var Americana), beech (Fagus ferruginea, Ait.), white ash (Fraxinus Americana, L.), white (Juglans cinerea, L.) and black walnut (J. nigra, L.) and wild cherry (Prunus serotina, Ehrh.) furnish valuable woods for finishing the interiors of houses, for making furniture and for cabinet work. From dogwood (Cornus florida, L.) handles of tools; from sour gum (Nyssa sylvatica, Marsh.) and American elm (Ulmus Americana, L.) hubs of wheels; from sycamore (Platanus occidentalis, L.) meat-blocks, and from hop-hornbeam (Ostrya Virginica, Willd.) mallets and mauls are made. Red cedar (Juniperus Virginiana, L.) is used to make moth-proof chests and for fine posts.

The native fruits growing on trees are not very numerous, yet some of them do not seem to have received the attention from pomologists which they deserve. The European settlers finding the fruits of their old homes to thrive in their new abode did not deem it necessary to develop and improve the wild fruits about them. The persimmon attracted the attention of Captain John Smith, who speaks of three sorts of plums, the red and the white, like English hedge plums, "but the other, which they call Putchamins, grow as high as a Palmata. The fruit is like a medlar; it is first green, then yellow, and red when it is ripe. If it be not ripe it will draw a man's mouth awrie with much torment, but when it is ripe it is as delicious as an Apricock." The persimmon growing wild is subject to much variation in the size and quality of its fruit. A judicious selection and cultivation of one of the almost seedless varieties often found in a state of nature would doubtless repay the care bestowed upon it. The serviceberry (Amelanchior Canadensis, T. and G.) is another fruit that is worthy of cultivation. The Chicasa plum has been improved and is sometimes cultivated. Elderberries are used in making wine, and in some places the dried berries are made into pies. The sugar maple is extensively used in making maple sugar. The wild nuts most prized are black walnuts, chestnuts, chinquapins, hickory nuts (the shellbark being the best) and

wild hazelnuts. The white walnut is little used in Maryland, except for pickling, the black being considered much superior.

To the massing of trees in forests the landscape owes much of its attractiveness, and there are few more beautiful objects in animated nature than an individual tree which a favorable environment has allowed to attain its perfect development and symmetry. Each species has its own particular form and its own peculiar beauty, no less, though different, in our temperate zone than in the tropics, and only less noticed because more familiar. Humboldt considers it an undertaking worthy of a great artist to study the character of the different vegetable groups "on the grand theatre of tropical nature." The delicate shades of our early spring, the deeper hues of summer, the gorgeous tints of autumn, and the sober colors of bare trunks and limbs of winter offer a no less attractive variety to the painter or the lover of beauty. The red maple, the dogwood and the red-bud give to the forests of early spring a contrast of colors, which adds much to its charms.

### CLIMBERS.

Intimately associated with trees are the larger climbers, which depend upon them for support. The most important of these are four species of grape: Vitis Labrusca, L., V. rotundifolia, Michx., the northern and the southern fox-grape, V. æstivalis, Michx. and V. cordifolia Michx., both locally known as chicken-grapes. Both the northern and southern fox-grape have been cultivated; the former has given rise to the Isabella, the Catawba and the Concord, while the latter is the origin of the Scuppernong grape. The climbing bittersweet (Celastrus scandens, L.) Virginia creeper (Ampelopsis quinquefolia, Michx.), often confounded with poison-oak (Rhus Toxicodendron, L.), and trumpet creeper (Tecoma radicans, Juss.) should be mentioned for their beauty, and poison-oak should be known to be avoided. It may be easily distinguished from the beautiful and harmless Virginia creeper by its three leaflets. Its near relative, the poison sumach, (Rhus venenata, DC.), a swamp shrub from six to eighteen feet in height, enjoys with it the odious distinction of being the only plants growing in Maryland which are poisonous to the touch. Among the lesser climbers are: Virgin's bower (Clematis Virginiana, L.), moonseed (Menispermum Canadense, L.), climbing hempweed (Mikania scandens, L.), several species of morning-glory, and wild yam (Dioscorea villosa, L.). The greenbrier, of which there are three species common, renders in many places the shrubbery along streams difficult of passage.

### NATIVE SMALL FRUITS.

The wild strawberry, blackberry, dewberry and raspberry are everywhere plentiful. Three species of huckleberry, as many of blueberry and one of cranberry are found. The fruits are extensively used in the country districts, and dewberries, blackberries and huckleberries (by which name blueberries also are commonly known) are sent in considerable quantities to the Baltimore markets. They are for the most part free to any person who will take the trouble to gather them, and afford a welcome addition to the table, or to the income, of many persons throughout the State.

### WEEDS.

When the forests are cleared away for the purposes of agriculture, new conditions are created and new plants make their appearance. Not only are the trees destroyed, but the plants that found a congenial home in their shade, perish, and others spring up which had previously kept aloof because of their love of sunshine. If a dozen square yards be cleared in the midst of a forest the flora of this small surface will quickly change. Even the fall of a tree will change the vegetation of the space opened to the sunlight. The plants that avail themselves first of the new condition differ according to soil and situation. In the western part of the State the great willow herb (Epilobium angustifolium, L.) is one of the first comers; in the rich woodlands of the Piedmont Region fireweed (Erechthites hieracifolia, Ref.) and wild lettuce (Lactuca Canadensis, L.) are characteristic. In the sandy portion of the Coastal Plain the trees are often succeeded, if the clearing be not promptly cultivated, by chinquapin bushes or dwarf oak. After a few years of careful cultivation these first weeds retire to the borders of the forest, the fence corners and other uncultivated spots. These are for the most part native plants, and are not generally the most troublesome weeds. The farmer's greatest difficulty is with weeds of foreign extraction, which have been intentionally or unintentionally brought into the country by the white man. Many of these are dependent upon man both for their dispersion and for the conditions necessary to their growth. They infest the yard, the garden, the grainfield, the meadow and the pasture, but do not spread generally in uncultivated regions. Some are brought into the country mingled with the seed of useful plants, others among the ballast of vessels. Over fifty species of foreign plants may be found growing upon the ballast heaps at Canton, some of which will doubtless spread to the neighboring fields and become established. During the colonial period, when foreign vessels unloaded in every navigable river and creek, many more centres of dispersion existed than at present, and hence the numerous "advents from Europe" which have become naturalized.

Among the most troublesome foreigners in fields are Viper's bugloss (Echium vulgare, L.), Canada thistle (Cnicus arvensis, Hoffm.), ox-eye daisy (Chrysanthemum Leucanthemum, L.), wild carrot (Daucus carota, L.), lamb's quarter (Chenopodium album, L.), and bitter dock (Rumex obtusifolium, L.), from Europe. Among yard and garden pests may be mentioned common mallow (Malva rotundifolia, L.), curled dock (Rumex crispus, L.), common plantain (Plantago major, L.), ribgrass (Plantago lanceolata, L.), common purslane (Portulaca oleracea, L.) and burdock (Arctium lappa, L.), from Europe, pigweed (Amarantus retroflexus, L.) and Sida spinosa, L., from the tropics, and velvet-leaf (Abutilon Avicennæ Gaertn.), from India. Corn cockle (Lychnis Githago, Lam.), is a native of Europe, and is especially troublesome in wheat fields, because it ripens its seeds at harvest time. The seeds are too near the grain in weight to be separated by fanning, and are therefore likely to be replanted with wheat in the fall.

Among troublesome native weeds are ragweed and great ragweed (Ambrosia artemisiæfolia, L. and A. trifida, L.), the latter very rank in rich river bottoms, several species of Erigeron known as horseweed, daisy fleabane, etc., Aster ericoides, L., beggar-ticks (Bidens frondosa, L.), and Spanish needles (Bidens bipinnata, L.), the last two especially in corn fields.

### THE LARGER ORDERS.

The Composite family (Compositæ), is more largely represented in genera and species than any other, and probably also in individuals. In autumn especially they predominate, and Asters, Solidagos, Eupatoriums of many species, with many other genera, everywhere abound. The grasses (Gramineæ), are not far behind Compositæ in species, but they do not occupy so conspicuous a place in the landscape except when in cultivation. The sedges (Cyperaceæ) come next, owing to the numerous species of Carex. This genus has a far greater number of species than any other growing in Maryland. It alone comprises two-thirds of the species of Cyperaceæ. The Pulse (Leguminosæ), the Rose (Rosaceæ) and mint (Labiatæ), families are far more numerous in species than any except the three orders already mentioned. The Heath (Ericaceæ), the Figwort (Scrophulariaceæ), the Mustard (Cruciferæ), the Fern (Filices), the Parsley (Umbelliferæ), the Oak (Cupuliferæ), the Orchis (Orchidaceæ), the Lily (Liliaceæ), the Crowfoot (Ranunculaceæ), the Pink (Caryophyllaceæ) and the Buckwheat (Polygonaceæ) families rank next in this respect.

### SPECIALLY ATTRACTIVE FLOWERS OF SPRING, SUMMER AND AUTUMN.

In the early spring the most beautiful flowers are found quite near the ground, which, in favored spots, they fairly carpet. Trailing arbutus

(Epigea repens, L.); hepatica (Hepatica triloba, Chaix); spring beauty (Claytonia Virginica, L.); bluets (Houstonia cærulea, L.); violets of a dozen species, blue, white and yellow, obolaria (Obolaria Virginica, L.); dog-toothed violets (Erythronium Americanum, Ker.); wild ginger (Asarum Canadense, L.); dentarias (Dentaria heterophylla, Nutt. and D. laciniata, Muhl.); rue anemone (Anemonella thalictroides, Spach.); bishop's cap (Mitella diphylla, L.); Dutchman's breeches (Dicentra Cucullaria, DC.), a name which one feels ashamed to apply to this most delicate and beautiful little flower; wind flower (Anemone nemorosa, L.), and wild pink (Silene Pennsylvanica, Michx.), are all low-growing plants flowering in early spring. Mertensia (Mertensia Virginica, D C.); wild columbine (Aquilegia Canadensis, L.); wild cranesbill (Geranium maculatum, L.); azalea, or wild honeysuckle (Rhododendron nudiflorum, Torr.), as it is sometimes called; polemonium (P. reptans, L.); Indian cucumber root (Medeola Virginiana, L.), and spiderwort (Tradescantia Virginica, L.), bring us to the end of spring.

Among summer flowers worthy of special mention, are the fringe-tree (Chionanthus Virginica, L.); swamp honeysuckle (Rhododendron viscosum, Torr.); staggerbush (Andromeda Mariana, L.); goat's rue (Tephrosia Virginiana, Pers.); wild roses, pyrolas and chimaphilas, partridge-berry (Mitchella repens, L.), growing in such profusion in some places as to cover the ground and to scent the air for some distance; nine-bark (Physocarpus opulifolius, Maxim.); goat's beard (Spiræa Aruncus, L.), numerous species of Desmodium and Lespedeza, the most plentiful wood flowers in midsummer; the American laurel (Kalmia angustifolia, L.), forming thickets on hillsides and densely covered with blossoms; meadow beauty (Rhexia Virginica and R. Mariana, L.); great laurel (Rhododendron maximum, L.), most beautiful of mountain flowers; kosteletzkya (K. Virginica, Gray); sabbatias (S. angularis, S. stellaris and S. chloroides, Pursh); sweet-pepper bush (Clethra alnifolia, L.); magnolia (M. glauca, L.); monarda (M. didyma, L.), etc.

The autumn flora is largely composed of Compositæ, but the gerardias, gentians and lobelias will also attract attention. The fringed gentian (Gentiana crinita, Frœl.), is probably the most beautiful of fall flowers. The golden-rods (Solidago), take the lead among the Compositæ. The dogwood, the holly (Ilex opaca, Ait. and I. verticillata, Gray), and other trees or shrubs are covered with red berries, which are attractive to the eye of man and to the palate of many birds.

### PLANTS OF PECULIAR HABITS.

Three genera are found within our own limits which have the most peculiar of habits, that of capturing insects. Two of these, sundew (Drosera) and bladderwort (Utricularia) feed upon the prey captured.

This is probably the case with the pitcher-plant also, but the fact has not been so clearly demonstrated. Sarracenia (pitcher-plant) and Drosera grow upon the borders of marshes. Utricularia is a water or marsh plant. Sarracenia captures its prey in the so-called pitchers, which are constantly kept half full of water, into which insects fall and being unable to escape perish. The pitchers appear to be formed by a union of the outer margins of the leaves, but upon closer examination they are found to be specially modified petioles. A rosette of such leaves surrounds each flower-stalk at its base. The flower-stalk of sundew is provided with a circle of leaves around the margins of which are rows of tentacles. At the extremity of each tentacle is a small drop of a mucilaginous substance, which has somewhat the appearance of a drop of honey and glistens in the sun like dew. Upon the approach of a small insect so as to touch one of these tentacles it is held by the sticky substance, and the remaining tentacles are one after the other bent over and fasten it more securely. Finally the leaf folds over it transversely and remains in this position until all the substance of the insect that is required by the plant is absorbed, when leaf and tentacles resume their normal position.

Bladderworts, at least those that are insectivorous, float in the water and are provided with bladders on the dissected leaves. The bladders are constructed on the principles of an eel-pot, easy to enter and almost impossible of egress. In these bladders small aquatic creatures are captured in large numbers and afford nourishment to the plant.

Eel grass or wild celery (Vallisneria spiralis) is a plant which grows in several feet of water in the tide regions. It is fastened by its roots at the bottom of the water, and the sterile flowers are borne on short stalks which remain submerged. The fertile flowers are borne on long stalks spirally coiled, so that they may be lengthened or shortened by loosening or tightening the coil. At the time of blooming the sterile flowers break from their stalks, float to the surface and shed their pollen upon the water, which brings it into contact with the pistils of the fertile flowers, whose stalks are lengthened so that they are always kept at the surface by the loosening or tightening of the coll as the tide rises or falls. When fertilization has been secured, the coil tightens permanently and the seeds are ripened under water. The root of this plant is the favorite food of the canvas-back and is said to give its flesh the delicate flavor for which this duck is so highly prized in this region.

Utricularia inflata, one of the bladderworts above mentioned, has the further peculiarity of raising the flower stalk above the water on five or six inflated leaf petioles arranged like a tripod. On these stalks are borne several pretty yellow flowers, for which reason they have been given the not inappropriate name of water-candles.

Among parasitic plants are sweet pine-sap (Schweinitzia odorata, Ell.) parasitic on the roots of herbs, found near Baltimore and Cumberland; Indian pipe (Monotropa uniflora, L.) on roots, pine-sap (Monotropa Hypopitys, Bart.) on the roots of beech trees, dodder (Cuscuta) on the bark of herbs and trees, and American misletoe (Phoradendron flavescens, Nutt.) with us principally on the sour gum (Nyssa).

### SHORE AND WATER PLANTS.

In the waters of the bay and navigable rivers are found many species of water plants growing in some situations in such numbers as to impede the passage of boats. They are principally Potamogetons of different species and Anacharis. Water chinquapin (Nelumbo lutea, Pers.), the largest flowered of our native plants, is found in some of the rivers emptying into the Potomac. Water lily (Nymphæa odorata, Ait.), yellow pond-lily (Nuphar advena, Ait. f.), water-shield (Brasenia peltata, Pursh), ditch-grass (Ruppia maritima, L.), and horned pond-weed (Zannichellia palustris, L.) grow in shallow water or in ponds.

The shores of the bay in many places are eaten into by the waves, causing masses of earth to fall, which are gradually removed by the water, leaving the bank again exposed to the encroachments of the waves. That this process is not everywhere more destructive is due to the protection afforded by plants which love a situation where their roots are daily covered by water. These are mainly certain grasses and sedges. Where a mass of sod has been formed by the densely matted roots of these plants, the waves beat upon them in vain, and the destruction of land at such points ceases. If part of the sod be washed away by a more than commonly violent storm, the damage is repaired by the vigorous growth of the next season. By their aid not only is the shore protected in exposed places, but in sheltered places the land reclaims what has been taken from it at unprotected exposed points. At the point beyond which the highest tide seldom reaches, highwater shrub (Iva frutescens, L.) and groundsel-tree (Baccharis halimifolia, L.) are found. In some places the waters throw back what they have taken from the land elsewhere in sand heaps, which are seized by the roots of plants, held firmly against wind and water, and gradually converted into tillable land. Many instances of these contests between waves and plants (for the land itself is passive) may be found on the shores of the bay and its tributaries. In passing over such new-made land from the new to the old shore, the vegetation is found arrayed in ranks. The shore-protecting or land-reclaiming plants are in advance, the land in their rear being given up to other plants to which it has become by their action adapted, and these following the advance guard will surrender the soil behind them, or landward, in succession to others.

Several orders deserve special treatment by reason of their more general utility or beauty. The Orchid, the Grass and the Fern families have been selected. Orchids are usually associated with the tropics, and ferns are also found in greater luxuriance and variety in warm climates. The grass family is probably the most generally useful of all orders of plants. Their usefulness is by no means limited to the food material they supply to man and beast.

### ORCHIDS (ORCHIDACEÆ).

Thirty species of the Orchid family have been reported in Maryland. They are all terrestrial, and twelve of the seventeen genera described in Gray's Manual are represented. The most conspicuous are the lady's slippers, of which we have four species: Cypripedium acaule, Ait., C. pubescens, Willd., C. parviflorum, Salisb., and C. spectabile, Swartz. The first, the purple lady's slipper, grows plentifully in pine woods, the second, large yellow lady's slipper, is less plentiful and much more attractive, the third, small yellow lady's slipper, is still more rare, and the fourth, showy white lady's slipper, is the most beautiful, and among the rarest of our plants. Calopogon pulchella, R. Br. and Pogonia ophioglossoides, Muhl., rank next to the last mentioned in beauty. Pogonia verticillata, Nutt., has a rather large flower, which is rendered inconspicuous by its want of bright color. The genus Habenaria is represented by ten species; H. ciliaris, R. Br., yellow-fringed orchis, H. blephariglottis, Torr., white-fringed orchid, and H. peramœna, Gray, of violet-purple color, have attractive flower clusters. The others are not striking, except H. orbiculata, Torr. whose leaves, (eight inches in diameter), spread flat upon the ground, with shining upper and silvery under surface, render the plant a conspicuous object in wooded regions among the mountains. Goodyera pubescens, R. Br., is everywhere plentiful, and G. repens, R. Br., is not scarce in the mountains. Of the species of Spiranthes, ladies' tresses, S. gracilis, Big., is found in dry situations, S. cernua, Richard, in wet places inland, and S. præcox, Watson, in wet grassy places near the shore of tide-water. Liparis liliifolia, Richard, is not rare in rich woods. Orchis spectabilis, L., is quite plentiful. Microstylis ophioglossoides, Nutt., is small, delicate and graceful. The species of Corallorhiza, Tipularia discolor, Nutt. and Aplectrum hyemale, Nutt., are inconspicuous by reason of dull colors, and the last two are more easily found in fall or winter by the leaf, which is absent in the flowering season.

### GRASSES (GRAMINEÆ).

Of grasses growing spontaneously in Maryland, there are about fifty genera, and considerably upward of a hundred species. It is needless to speak of the importance to man of the cultivated species as food, both

for himself and for his domestic animals. Agriculture very largely consists in the raising of grasses, wheat, rye, oats and Indian corn for the grain, and timothy, orchard grass, redtop, and others for hay. Many grasses growing without cultivation also afford excellent cattle food, in either a green or dried condition. There are found species peculiar to every situation, on sterile or rich soil, damp or dry, in meadows or forests. To discuss fully the agricultural aspects alone of the grasses would require a volume. A few only can be mentioned for the special points of interest that they possess.

Reed (Phragmites communis, Trin.) is the tallest of our grasses, reaching a height of twelve feet. Its large terminal panicle renders it one of the most beautiful. Of no value as food for animals, it has been utilized elsewhere in many ways; the reeds for thatching and as shafts for arrows, the panicle as a dye. It is described as "one of nature's most valuable colonists, and is largely concerned in the gradual conversion of swamps and fens, stagnant pools and other unwholesome spots where water accumulates, into dry land." This process may be seen in operation within a few miles of Baltimore.

Indian rice (Zizania aquatica, L.) is another tall grass, growing on the swampy borders of streams and in shallow water. Of this plant Captain John Smith says: "Mattoume groweth as our bents do in meddows. The seede is not much unlike to rie, though much smaller. This they (the Indians) use for a dainty bread, buttered with deare suet." According to Vasey, it is still gathered by the Indians in Minnesota and the northwest for food. Reed-birds resort to it in great numbers when the seeds are ripe, and many are killed by gunners, who stand in boats which they push slowly through the grass. This sport is extensively practised on the Patapsco, near Baltimore. The bobolink as he migrates northward in spring, is little noticed by sportsmen, but when he returns in the fall, in sober plumage, and is fattened on Indian rice, he becomes under the name of reed-bird a much prized game.

Sea sand-grass (Ammophila arundinacea, Host.) is one of the most remarkable of grasses. Its services to man on sandy seashores have been incalculably valuable. Many square miles of agricultural land have been preserved by it, in England, Scotland and Holland, from destruction by the drifting sand. "It is common on the sea coast," says the author of "British Grasses," "establishing itself among the loose drifting sand, its extensive creeping roots have an amazing power in binding together the loose material of its home, and thus forming out of useless drifting sand a firm bank against the encroachments of the sea. So well was its value appreciated in the olden times that acts of Parliament were issued, first in Scotland and then in England also, forbidding any person to molest or injure the sea matweed on pain of

heavy fines and penalties." "The town of Provincetown, once called Cape Cod, where the pilgrims first landed, and its harbor, still called the harbor of Cape Cod, one of the best and most important in the United States, sufficient in depths for ships of the largest size and in extent to anchor three thousand vessels at once," says Flint, "owe their preservation to this grass." Though its services, happily, are not needed on a large scale in Maryland, a knowledge of what it has done elsewhere cannot but give us an increased respect for this member of our flora. Bermuda grass (Cynodon Dactylon, Pers.), with its low or prostrate, diffusely branching stems, which root freely at the joints, is our most common binder of sand. The shores are protected against waves by salt reed-grass (Spartina juncea, Willd.), salt marsh-grass (S. stricta, Roth.), spike grass (Distichlis maritima, Raf.), Panicum proliferum, Lam., and by several sedges, principally of the genus Scirpus (bulrush).

The small cane (Arundinaria macrosperma, Michx., var. suffruticosa, Munro) is found in great abundance in certain limited areas of sandy marsh land in inland situations. The canebrakes are not numerous, but where one occurs the plants grow close together in such numbers as to exclude other vegetation. The leaves remain through the milder winters, the plant being destroyed only by very severe weather. A succession of mild winters enables it to attain a much greater size than usual.

Among grasses whose value as food for cattle is well recognized are sweet vernal grass (Anthoxanthum odoratum, L.), which gives to new-mown hay its delicious fragrance, Kentucky bluegrass (Poa pratensis, L.), meadow fescue (Festuca elatior, L.) and rye-grass (Lolium perenne, L.). Many other grasses are eaten by cattle at some stage of their growth.

Some of the grasses that are troublesome in cultivated grounds, and, therefore, known as weeds, are crab grass (Panicum sanguinale, L.), barnyard grass (Panicum crus-galli, L.), foxtail (Setaria glauca, Beauv.), in corn-fields, green fox-tail (S. viridis, Beauv.), bur grass (Cenchrus tribuloides, L.), dropseed (Muhlenbergia diffusa, Schreber), wire grass (Eleusine Indica, Gaertn.) and cheat (Bromus secalinus, L.), among wheat.

Several species of Andropogon, the sedge of old sedge-fields, poverty-grass (Aristida dichotoma, Michx.), Panicum depauperatum, Muhl., wild oat grass (Danthonia spicata, Beauv.) and Festuca tenella, Willd, are indicative of very sterile soil.

In dry situations are found Aira caryophyllea, L., Deschampsia flexuosa, Trin., Danthonia sericèa, Nutt., Triodia cuprea, Jacq. The principal grasses of sandy fields are: Paspalum setaceum, Michx.; Panicum filiforme, L.; Aristida gracilis, Ell.; Sporobolus asper, Kunth; Eragrostis capillaris, Nees, and Uniola gracilis, Michx.; Paspalum laeve, Michx.; P. Floridanum, Michx.; Panicum crusgalli, L., var. hispidum; Leersia Virginica, Willd.; L. oryzoides, Swartz; Erianthus saccharoides,

Michx.; Phalaris arundinacea, L.; Trisetum palustre, Torr.; Glyceria Canadensis, Trin.; and G. obtusa, Trin, grow in wet or marshy places. The most common wood grasses are: Stipa avenacea, L.; Muhlenbergia sylvatica, T. and G.; M. Willdenovii, Trin.; Brachyelytrum aristatum, Beauv.; Elymus striatus, Willd. var. villosus, Gray; and Asprella Hystrix, Willd.

FERNS (FILICES).

In that part of the United States which lies east of the Mississippi, and north of Tennessee and North Carolina, the region of Gray's Manual, there are found twenty-one genera and sixty-two species of ferns. Of these, seventeen genera and thirty species are known to occur in Maryland. The greater number are found in shaded situations, many upon rocks, some in damp thickets, others in swamps, and but one, and that the rarest, cliff-brake (Pellæa atropurpurea, Link.) in dry exposed places upon the mortar of old walls or on calcareous rocks.

On rocks principally in woods may be found the common polypody (Polypodium vulgare, L.) in great abundance. The fronds remain green during the winter, as do those of Aspidium marginale, Swartz, and A. acrostichoides, Swartz (the Christmas fern), which grow abundantly in rocky woods, but are not confined to rocks.

Cheilanthes vestita, Swartz, Asplenium montanum, Willd., A. Trichomanes, L., Woodsia obtusa, Torr. and Cystopteris fragilis, Bernh., grow on shaded cliffs, by preference from the clefts in the rock. The walking fern (Camptosorus rhizophyllus, Link.), grows on mossy rocks. In woods among rocks are also found Adiantum pedatum, L., (maidenhair), and Asplenium ebeneum, Ait. In rich, damp situations in woods may be found Asplenium angustifolium, Michx., A. Filix-fœmina, Bernh., Phegopteris hexagonoptera, Fée., Aspidium spinulosum, Swartz, var. intermedium, D. C. Eaton, A. Goldianum, Hook., and Dicksonia pilosiuscula, Willd. Asplenium thelypteroides, Michx. is generally found in shaded spots. Pteris aquilina, L., and Osmunda Claytoniana, L., prefer damp places, but are able to exist in quite dry situations.

Lygodium palmatum, Swartz, (climbing fern), the most beautiful of our ferns, grows in moist thickets and climbs by twining. Onoclea sensibilis, L., and Aspidium Noveboracense, Swartz, are found in most thickets or meadows.

In swamps or on their borders, grow Woodwardia Virginica, Smith, W. angustifolia, Smith, Aspidium Thelypteris, Swartz, A. cristatum, Swartz, Osmunda regalis, L., and O. cinnamomea, L.

### MEDICINAL PLANTS.

The following is a list of medicinal plants growing in Maryland, classified according to parts used:

Roots. Polygala senega, L.; Saponaria officinalis, L.; Taraxacum officinale, Weber; Chichorium Intybus, L.; Inula Helenium, L.; Arctium Lappa, L.; Asclepias tuberosa, L.; Apocynum cannabinum, L.; Euphorbia Ipecacuanhæ, L.; E. corollata, L.; Angelica atropurpurea, L.; Ipomœa pandurata, Meyer; Phytolacca decandra, L.; Heuchera Americana, L.; Rumex crispus, L.; Hydrangea arborescens, L.; Apocynum androsæmifolium, L.; Baptisia tinctoria, R. Br.; Ceanothus Americanus, L.

Rhizomes. Aspidium marginale, Willd.; Acorus Calamus, L.; Triticum repens, L.; Veratrum viride, Ait.; Symplocarpus fœtidus, Salis.; Chamælirium luteum, Gray; Iris versicolor, L.; Aletris farinosa, L.; Cypripedium pubescens, Willd.; Polygonatum biflorum, Ell.; P. giganteum, Dietrich; Dioscorea villosa, L.; Sanguinaria Canadensis, L.; Geranium maculatum, L.; Nymphæa odorata, Ait.; Podophyllum peltatum, L.; Asclepias Cornuti, Decsne; Aralia nudicaulis, L.; Aristolochia Serpentaria, L.; Spigelia Marilandica, L.; Asclepias incarnata, L.; Caulophyllum thalictroides, Michx.; Collinsonia Canadensis, L.; Cimicifuga racemosa, Nutt.; Gillenia trifoliata, Mœnch; Triosteum perfoliatum, L.; Aralia racemosa, L.; Asarum Canadense, L.; Menispermum Canadense, L.

Tubers and bulbs. Arisæma triphyllum, Torr.; Dicentra Canadensis, D C.

Woods and twigs. Solanum Dulcamara, L.; Sassafras officinale, Nees.

Barks. Cornus florida, L.; Liriodendron Tulipifera, L.; Magnolia glauca, L.; Ilex verticillata, Gray; Prunus serotina, Ehr.; Salix alba, L.; Hamamelis Virginiana, L.; Viburnum prunifolium, L.; Quercus alba, L.; Quercus coccinea var. tinctoria, Gray; Rubus villosus, Ait.; Rubus Canadensis, L.; Fraxinus Americana, L.; Juglans cinerea, L.; Xanthoxylum Americanum, Mill.; Myrica cerifera, L.; Ulmus fulva, Michx.; Sassafras officinale, Nees.

Leaves and leaflets. Epigæa repens, L.; Kalmia latifolia, L.; Cassia Marilandica, L.; Datura Stramonium, L.; Hamamelis Virginiana, L.; Castanea sativa, Mill., var. Americana; Ilex opaca, Ait.; Chimaphila umbellata, Nutt.; Gaultheria procumbens, L.; Myrica asplenifolia, Endl.; Rhus Toxicodendron, L.

Herbs. Adiantum pedatum, L.; Ranunculus bulbosus, L.; Chelidonium majus, L.; Capsella Bursa pastoris, Mœnch; Helianthemum Canadense, Michx.; Hypericum perforatum, L.; Agrimonia Eupatoria, L.; Potentilla Canadensis, L.; Œnothera biennis, L.; Epilobium angustifolium, L.; Viola tricolor, L.; Drosera rotundifolia, L.; Eupatorium perfoliatum, L.; Erigeron Philadelphicus, L.; Erigeron annuus, Pers.; Erigeron strigosus, Muhl; Erigeron Canadensis, L.; Solidago odora, Ait.;

Helenium autumnale, L.; Anthemis cotula, L.; Achillea Millefolium, L.; Gnaphalium polycephalum, Michx.; Lobelia inflata, L.; Epiphegus Virginiana, Barton; Scrophularia nodosa, L., var. Marilandica, Gray; Chelone glabra, L.; Mentha piperita, L.; M. viridis, L.; Lycopus Virginicus, L.; Cunila Mariana, L.; Hedeoma pulegioides, Pers.; Melissa officinalis, L.; Monarda punctata, L.; Nepeta Cataria, L.; N. Glechoma Benth., Scutellaria lateriflora, L.; Leonorus Cardiaca, L.; Plantago lanceolata, L.; P. major, L.; Mitchella repens, L.; Galium Aparine, L.; Sabbatia angularis, Pursh.

Leafy Tops. Juniperus Virginiana, L.

Flowers and Petals. Tilia Americana, L.; Malva sylvestris, L.; Sambucus Canadensis, L.

Fruits. Morus rubra, L.; Humulus Lupulus, L.; Rosa canina, L.; Rhus glabra, L.; Cannabis sativa, L.; Diospyros Virginiana, L.; Chenopodium ambrosioides, L., var. anthelminticum, Gray; Arctium Lappa, L.

Seeds. Delphinium Consolida, L.; Datura Stramonium, L.

## THE TERRESTRIAL ANIMALS OF MARYLAND.

As the natural formation of Maryland possesses such varied characteristics, presenting, as it does, a gradual transition from the mountains of the western part of the State to the low-lying and swampy shores of the Chesapeake, we naturally find a diversified and interesting fauna. The Chesapeake, which has so bountifully endowed the State with valuable industrial resources, and given the Maryland kitchen an unrivalled renown, furnishes in its water-fowl the most interesting and characteristic feature of the terrestrial fauna.

Our ducks are the same birds that are seen on Hudson's Bay and the northern lakes. Following the edge of winter along the Atlantic coast, they appear in the Chesapeake in great numbers. The great beds of wild celery in the shallow waters of the bay and its tributaries are their favorite feeding grounds, and it is here that their flesh acquires its greatest delicacy and best flavor. The canvas-back, prized alike by the bon-vivant and the sportsman, is the most sought after and widely known of all our ducks. Among other ducks which make the waters of Maryland their winter home, may be mentioned red-heads, bald-pates, mallards, black-heads and teal. All these are found in great numbers, and are highly valued for the table.

Swans, and geese of several species, also abound, and although they are wild and difficult to approach, yet they afford most excellent shooting. There are various ways of shooting ducks on the Chesapeake and its adjacent waters. Sportsmen, as a rule, shoot from "blinds" and use decoys, while the market gunners prefer the "sink-boat," a sort of floating blind, or the nefarious and unlawful "night-reflector." A "blind" is

any sort of artificial concealment placed somewhere within a hundred yards of the shore—further than this the law forbids. It is generally stationed in comparatively shallow water, and the place selected is preferably one where wild celery is growing on the bottom, for then it is sure to be a feeding ground for the ducks. The wooden decoys are anchored in front of the "blind" at a distance of about thirty yards, and are well calculated to deceive any passing flock or "bunch" of ducks. Often the "blind" is "baited" by scattering in its vicinity a quantity of corn or some other kind of grain. The ducks are sure to find this, and will come to the spot to feed as long as the grain lasts. On the Chesapeake ducks are often shot in great numbers from points, bars or bridges as they fly over.

Another method of shooting ducks, which is occasionally practised, is called "toling." A spot is selected where the bottom slopes off somewhat abruptly, for the birds will not approach near to the shore except by swimming. The gunner, on observing ducks "bedded" some distance from the shore, conceals himself, and causes a well-trained dog, which should be of a red-dirt color, to gambol before him, by throwing the animal chips of wood or bits of bread, which he catches in his mouth. The ducks, attracted by the antics of the dog and overcome by curiosity, cautiously approach the spot, and frequently pay the penalty for their temerity. A bright red cloth waved on the end of a pole will often have the same effect. The practise of "toling" was undoubtedly derived from the Indians, who imitated a habit of the fox. This cunning animal has been observed to resort to a similar ruse to attract and capture young ducks.

The ducking shores of the Chesapeake, which are often used as fishing shores in summer, are as a rule owned by wealthy citizens. Some are leased to clubs, but most are private property and very carefully guarded.

The reed-bird, which is accounted such a delicacy throughout the country, is found in great abundance in Maryland. This familiar bird has various names, being known as the bobolink, meadow-wink or skunk blackbird in the Northern States, and the reed-bird in the Middle States, while in the South it is called the rice-bird, from its habit of feeding on wild rice. In the West Indies, where this bird spends its winters, it is known as the butter-bird. The name "ortolan," which is often applied by restaurateurs to the reed-bird as well as to the rail, is a curious misnomer. The ortolan is a European bird, and belongs to an entirely different family, that of the finches and sparrows. In the spring the reed-bird passes north to breed, spreading over the Middle and Northern States. It is then that the males assume their gay dress of black, white and buff, and fill the meadows with their wild delirious song. Early in

the fall they begin to moult, and finally assume the sombre plumage of the females. The birds now start on their southern journey, feeding and growing fat on wild oats and rice as they go, and thronging the marshes in immense flocks in company with the blackbirds. In the months of autumn the swamps along the Chesapeake and its estuaries are literally alive with these little birds, which are shot in great numbers for the market. The partridge, called quail in the North and West, but universally known as "bobwhite," is met with all over Maryland. It is the characteristic game bird of this country, and in the eyes of the sportsman is a paragon of game qualities. The law of the State wisely allows the birds to be shot only from November 1 to February 1, but in the open season good partridge shooting can be had, especially in the lower counties.

Among other game birds which are to be found in Maryland, are wood-cock, ruffed grouse, known here and further south as the "pheasant," snipe, plover, and the sora or Carolina rail. The wild turkey is occasionally shot in the mountainous counties.

Almost every family of North American birds is represented in the State by numerous species. In addition to the birds already referred to, may be mentioned thrushes, wrens, warblers, swallows, sparrows, blackbirds, fly-catchers, the whip-poor-will and night hawk, the chimney-swift, the ruby-throated humming bird, the kingfisher, American cuckoos, woodpeckers, numerous varieties of owls and hawks, the wild dove, and the American vulture, or turkey buzzard. The common American crow is very abundant; the "roosts" of this bird are of enormous extent, frequently covering several acres. The "Baltimore oriole" is dear to the heart of every Marylander. Gayly attired in orange and black, it is familiarly associated in the minds of Marylanders with the gold and black colors of this State. It is not nearly so numerous as it used to be, and several years ago, when it was in danger of being exterminated at the hands of curiosity-hunters, stringent laws were passed for its protection. Shooting, catching or killing of this beautiful little bird is absolutely prohibited, and even destruction or molestation of its nests is a punishable offense.

Of mammals quite a large number are to be found in Maryland. The mountains contain deer, and the black bear is occasionally seen in the westernmost counties. Ground-hogs, commonly known as "woodchucks," rabbits, weasels, skunk, several varieties of mice, minks, otters, musk-rats, moles, opossums and four species of squirrels abound. The wildcat, or "catamount," is still common in the least settled regions.

Various kinds of harmless snakes are innumerable, especially the common black snake, which often grows to a length of five or six feet. Two venomous snakes occur, the copperhead, in the half cultivated

districts, and the rattlesnake in the mountainous. The latter, despite all efforts to exterminate it, breeds with remarkable rapidity. In the summer it comes down into the valleys, where it is much dreaded. But being sluggish and timid, and giving its warning rattle when approached, it is much less to be feared than the more active and malicious copperhead, which attacks without warning. The black snake is its worst enemy, and always comes off victorious.

In this meagre account of the terrestrial fauna an attempt has been made to give prominence to the more characteristic and interesting animals of the State, as well as to convey some idea of the variety and numbers of the more important animals.

# CHAPTER VII.

## FISH AND FISHERIES.

### THE FISHERIES OF MARYLAND.

No other State in the Union has, in proportion to its area, a coast line so extensive as that of Maryland, and more persons are supported in Maryland by capturing and preparing the products of the water than in any other State.

The fisheries are our most characteristic industry, and while it is said that there is one State in which the capital invested in the fisheries and the cash value of their product are greater, we are by far the foremost State in our opportunities for improving and extending our fisheries.

The most valuable and important marine productions of Maryland are of such a nature that they may be multiplied indefinitely by man, and in this our State stands pre-eminent and offers unrivalled opportunities for the investment of capital and for the wise application of a knowledge of nature. While Maryland may well be proud of the bounties which nature has lavished upon her, she has even greater reason to boast of the opportunities which nature has given her for increasing these bounties by human industry and intelligence.

It is not our purpose to write a natural history of the State, and the space must be devoted to a few of the most important and characteristic inhabitants of our waters, and to a simple untechnical account of their life, showing their capacity for improvement by human influences. We shall deal little with statistics of the past, as our chief interest is in the possibilities of the future.

### THE SHAD.

The first place must be given to that most delicate and delicious food fish, the shad, as this will lead us at once into a field where man's dominion over nature is already established; for we shall show that the shad is already, in a certain sense, a domestic animal and that our fisheries to-day owe their existence to the intelligence and knowledge of nature, which have enabled man to keep up the supply by artificial means.

The fully grown shad is an inhabitant of the open ocean, but each spring these fishes visit our shores, enter our inlets and bays, and make their way up to the fresh water, where they deposit their eggs.

The supply for the market is caught during the spring migration, when the fishes enter our inland waters heavy and fat after their winter feast upon the abundant food which they find in the ocean. As they spend most of the year gathering up and converting into the substance of their own bodies the minute marine organisms which would otherwise be of no value to man, and as their instincts compel them to bring back to our very doors this great addition to our food supply, and thus to put at our service a vast fertile area of the ocean, which, without their aid, would be beyond our control and of no service to man, their economic importance is very great.

In the year 1880 the fisheries census, and special investigations under the direction of the U. S. Fish Commission, showed that there had been a most rapid and alarming decline in the value of the shad fisheries in the rivers, bays and sounds of our Atlantic coast, and that there was reason to fear that in a few years the shad would cease to be of any value as a fish supply.

The fishermen fully recognized the danger and were loud in their demands for laws to restrict other fishermen who, they held, were causing the decline by improper ways of fishing.

The fishermen of the interior complained of the fishermen further down along the shores of the salt-water bays and sounds, where the fishes were captured in pounds and weirs, far away from their spawning grounds. They believed that legislation alone could save the fisheries, and that if these obstructions were prohibited by law, and all the shad were permitted to reach fresh water before they were captured, enough eggs would be deposited to keep up the supply, but that the destruction of such numbers in salt water must necessarily result in extermination.

This seemed to fresh-water fishermen to be good logic, but the salt-water fishermen took a different view of the matter. They wanted more legislation themselves, but of a different sort, and they claimed that what was needed was protection for the shad upon the spawning grounds. They said that they themselves furnished most of the shad for the market; that without them the cities could not be supplied, and that enough shad escaped their nets and reached fresh water to supply all the eggs that were needed, if they could be left to lay their eggs in peace.

There seemed to be good sense in this view also, and as in the endless controversies between the oyster dredgers and the oyster tongmen, it was difficult for a disinterested outsider to tell who was right. The only thing which seemed clear was that the shad were growing scarce,

and that if the Legislature did not do something to protect them, they would soon be exterminated.

In 1888 more shad were caught in salt water than were caught altogether in 1880, and yet the shad fisheries are now increasing in value from year to year, and this change has been brought about, not by the enactment of laws to restrict the fishery, but by the production of more fishes.

In 1880 the U. S. Fish Commission began, systematically and upon a large scale, the work of collecting the eggs from the bodies of the shad which were captured for the market in the nets of the fishermen. These eggs were artificially fertilized and the young were kept for a short time in hatching jars, and the waste of eggs was thus prevented. This work has been prosecuted steadily ever since, and the results, up to the end of the season of 1888, are given in the following table:

| | In Salt and Brackish Water. | In Rivers. | Total. | Percentage of increase over 1880. |
|---|---|---|---|---|
| 1880 | 2,549,544 | 1,591,424 | 4,140,968 | ..... ..... |
| 1885 | 3,267,497 | 1,906,434 | 5,172,931 | 25 per cent. |
| 1886 | 3,098,768 | 2,485,000 | 5,584,368 | 34 " |
| 1887 | 3,813,714 | 2,901,661 | 6,715,405 | 62 " |
| 1888 | 5,010,101 | 2,650,373 | 7,660,474 | 85 " |

The money value to the fishermen of the excess in 1888 over the total catch of 1880 was more than $700,000. We have no record for 1889 or 1890, but in the latter year the fisheries were more profitable than they have been for many years, and our markets were stocked with an abundance of fine shad, which were sold at prices which ten years before would not have been thought possible. The percentage of increase in 1889 and 1890 has been much greater than it was in any of the years given in the table, and this result is not due to any change in the method of fishing. It is exclusively due to the increase in the supply.

The conditions are now more unfavorable than ever to natural reproduction, and it can be proved that if no shad had been produced by man, while the other factors had remained as they now are, the fisheries would be completely ruined and abandoned.

The mature fishes are now excluded by dams and other obstructions from the most valuable spawning-grounds, and the area which is now available is restricted to the lower reaches of the rivers, where there is little proper food for the young, and where the bottoms are so continually and assiduously swept by drift nets and seines that each fish is surely captured soon after its arrival. The number of eggs which are naturally deposited is now very small, for while the spawning-grounds have increased from 1,600,000 to 2,600,000, the take in salt water has increased from 2,500,000 to 5,000,000, and the shores of our bays and sounds are now so lined by fyke nets and pounds that the number of shad which

reach the spawning-grounds at all is proportionately much less than it was in 1880, and more shad are now taken each year in salt water, where spawning is impossible, than were taken altogether in 1880.

This fact, rightly considered, means that the shad is now an artificial product, like the crops of grain and fruit which are harvested on our farms and orchards.

If more shad than the natural supply were taken in 1880 in all waters, and if still greater numbers are now taken each year in deep water, before they reach the spawning-ground, it follows that we are now entirely dependent upon the artificial supply.

No animal on earth or in the ocean large enough to be valuable as human food can long survive the attacks of an enemy who brings against it the resources, the destructive weapons, and the intelligence of civilized man. Fortunately, the resources which render man the most irresistible of enemies, also enable him to become a producer as well as a destroyer; and while the fear of him and the dread of him is upon every beast of the earth and upon every fowl of the air, and upon all that moveth upon the earth, and upon all the fishes of the sea; while they are all delivered into his hands, and are powerless to resist him; he alone is able to make good his ravages by agriculture, and by domestication, by the selection and improvement of animals and plants, and by artificial propagation.

In some respects the shad is the most remarkable of domesticated animals, for it is the only one which man has as yet learned to rear and to send out into the ocean in great flocks and herds to pasture upon its abundance, and to come back again, fat and nutritious, to the place from which it was sent out.

From this point of view the maintenance of the shad fishery by man, by the use of artificial means, is one of the most notable triumphs of human intelligence over nature.

As the shad is a marine fish which does its eating at sea, and as its visits to fresh water are only for the purpose of reproduction, the numbers which make their way up our rivers are out of all proportion to the capacity of the streams for furnishing them with food.

When they visit our coast in the spring they enter the mouths of the rivers in great schools, and travel up them to a most surprising distance; the total length of the journey from the sea to the spawning ground and back again, which is made almost or quite without food, often exceeding a thousand miles.

Many of them, and among these the largest fishes, go on and on until they meet with some insurmountable obstacle, such as a waterfall or dam, or until they reach the sources of the river. Before dams were built in the Susquehanna river, many of the shad which entered the

Chesapeake Bay at the Capes continued their long fasting journey across Virginia, Maryland and Pennsylvania into the State of New York, and travelled through more than five hundred miles of inland waters before they reached their journey's end.

Near the New York line fragments of Indian pottery, stamped with the impression of the shad's backbone, have been found, and the numbers of stone net-sinkers which have been picked up in the Wyoming valley show that the Indians had known and used these shad fisheries long before the first white settlers found them there at work with their rude seines.

In the early part of this century, before the construction of canals and the dams which supply them with water, there were forty permanent fishing stations in the northern half of Pennsylvania, beyond the forks of the Susquehanna at Northumberland, and some of them were worth from $1,000.00 to $1,200.00 a year to their owners, at a time when a dollar represented very much more value then it does to-day.

At one of these fisheries at Fish Island, near Wilkes-Barre, there is a record, which seems to be trustworthy, of the capture of ten thousand shad at a single haul. Most of these shad were salted and sold to the farmers, who came from fifty miles around to barter their farm products and the salt from central New York for their winter's supply of fish.

Dams across the river have cut off this valuable fishery from more than two hundred miles of the course of the Susquehanna river, and the profitable fisheries now reach for only a few miles above the boundary of Maryland.

The impulse which directs this wonderful journey and brings back from the ocean a marine fish like the shad and guides it on its long path through the rivers and far up into the interior of the country is most wonderful. To it the value of the shad to man is due; but our interest in it as a phenomenon of nature is quite independent of its economic importance, and we now have, through the researches of the naturalists of the United States Fish Commission, and especially those of Marshal McDonald, the commissioner, an insight into its causes, and while much still remains to be explained, we can now give a satisfactory explanation of most of the facts.

The subject has given rise to much speculation, but this has usually been based upon such scanty and erroneous information that it has little value. Each fish has generally been believed to go back to its own birth-place, and to enter our water on a definite journey to some specific little shoal or to the sandy shore of a particular stream.

This may be true of some migratory fishes, but there is evidence that it is not true of the shad. When young shad from the Atlantic were first placed in the Sacramento river they were expected to find their way

back into this river on their return as mature fish from the Pacific ocean. While many of them did return to this river, others made their appearance in considerable numbers in other rivers in which no young ones had ever been placed, and they have continued to spread further and further northward each year on the Pacific coast, until they are now found in every river between the Sacramento and Puget Sound, although there are no native shad in the Pacific.

In our own waters a fishery which is very productive one year may yield very few shad another year, and a stream which they enter in great numbers one season may be almost completely passed by another season. When the harvest of shad is unusually abundant in the Potomac river it is below the average in the Susquehanna, and a season of exceptional abundance in the Susquehanna river is a season of comparative scarcity in the Potomac.

These facts prove that the shad is not brought back to its birthplace by any unerring instinct of locality, but that the exact source of its migration is determined by external influences; and there has been much speculation as to the character of these influences.

It has been suggested that the fishes are urged by an instinct which causes them to swim against the current, and that when they feel the outflow from the mouth of a river they turn in and are thus led up and up the stream; but the outward current is so slight in the wide mouths of the bays and sounds of our southern coast that it is completely lost in the ebb and flow of the tide.

It has also been suggested that the shad are led by their fondness for fresh water; but the return to the sea of both the old shad and the young ones is part of the migration. The tendency to seek fresh water is undoubtedly connected in some way with the reproductive instinct, but we cannot believe that it is in itself enough to map out a definite path; and while the shad do not usually seek fresh water until the season for reproduction, there is one instructive exception to this rule, for the shad enter the St. John's river, in Florida, in November, or several months before the spawning season, which is not very much earlier in that river than it is on the tributaries of the Chesapeake Bay.

McDonald has made a careful study of the habits of migrating fishes in connection with the temperature of the water, and he has shown that when they enter the Chesapeake Bay its water is warmer than that of the ocean and that of the rivers, and that they remain in this deep, warm water until the rivers are gradually heated to a still higher temperature, when they enter these and swim upwards as the water grows warmer before them.

He has also brought together many other facts to show that the temperature of the water is an important factor in determining the migration.

As a rule, the opening of the shad fishing in the spring becomes later and later as we pass northwards along our coast; but there are many exceptions to this rule, for the season is earlier in a small river which arises in the warm low land, than it is farther south in a larger river which has its source in the high and cool mountain springs of the interior.

The shad usually make their appearance in the bay in February, although the height of the fishing season is in April and May, and in our northern tributaries even later. The male fish appear first, and they go up the river ahead of the females. When the temperature of a river rises gradually with the advance of the season, the period of migration is long, but if the whole course of the river is warmed by warm rains at its sources, they crowd into it tumultuously in great schools, and the season is very short.

These facts, and many others, have led McDonald to believe that while the purpose of the migration is the perpetuation of the species, its directing influence is the temperature of the water; and there can be no doubt that, so far as the first stages of the journey are concerned, this is the correct explanation, although the fish is no doubt urged to continue its journey further and further up by an instinctive desire to reach the spawning grounds.

The favorite spawning grounds, known to the fishermen as "shad-wallows," are the sandy flats near the shores of the streams, or the sand bars in their course. The fishes run up into them in pairs, in the early evening, after sunset, and the eggs are thrown out into the water while the fish are swimming about, but they soon sink to the bottom and develop very rapidly. The average number of eggs is about twenty-five thousand, but a hundred thousand have been obtained from a single large shad.

The young fishes remain in the rivers until late in the fall, feeding upon small crustacea, insect larvæ, the young of other fishes, and probably upon all the minute active animals of our fresh water, and they grow to a length of two or three inches by November, when they leave our waters for the ocean.

As the mature shad usually takes no food in inland waters, it is not fished for with hook and line, but as it is unsuspicious and absorbed in the completion of its journey, it is easily captured by nets and traps of all sorts, and most of the devices known to fishermen are utilized to capture it.

Before the shad enter our own bay our markets are supplied from our southern waters, and the fisheries of Albemarle Sound are remarkable for the gigantic size of the seines. These are sometimes more than a mile in length, and they gather in at one sweep all the fishes from a

thousand to twelve hundred acres. They are spread by steam boats, and their contents are dragged up on to the shore by steam engines. One seine of this sort gives employment to some seventy-five people, and has taken in one season, near the head of Albemarle Sound, fifty-two thousand shad, nine hundred thousand herring, and more than twenty-five thousand pounds of other fish.

Shad are caught in our waters by haul seines and in pounds, as well as by gill nets, or nets of fine twine, with meshes large enough to admit the head of the shad, and to entangle it by the gills. The gill nets used in shad fishing are usually small. They are sometimes stretched between stakes planted in the mud, when they are known as "stake nets," or they are stretched and allowed to drift with the tide, when they are known as "drift nets."

In the Susquehanna river these drift nets are used at night, and are set with a lantern at each end, and mounted upon a float. While they are drifting the fishermen in the boats "run" the nets, or pass the net line through their fingers from end to end. The presence of a fish is easily discovered in this way, and the part of the net which holds it is raised, the fish is removed, and the net is dropped, again to drift as before. It is necessary to remove the shad as quickly as possible, for almost as soon as they are caught they are seized, and rapidly devoured, as they hang in the net, by the eels which swarm in this river. The shad fishing ends with the upward migration, for they are so worn and thin with their journey and with their long fast, that they are not fit for food as they descend the river.

Two species of river herrings enter our inland waters in incredible numbers at about the same time with the shad, and their habits are so much like those of the shad, and the methods of capturing them so similar that it is not necessary to enter into details. They lay their eggs near the mouths of the rivers, and do not usually make long journeys into the interior like the shad.

They are abundant all along our coast, but the Chesapeake Bay and the North Carolina sounds are the centre of their distribution. Much greater numbers of them than of the shad are taken in our own waters, but the value of the product in money is much less.

Pennant, in his "Arctic Zoology," says that they run up the rivers and shallow streams of Carolina in such numbers that the inhabitants fling them ashore by shovelsfull, and the passengers trample them under foot fording the rivers. Even at the present day their numbers are very great, and eleven million have been gathered in the Potomac in a single season, and three hundred thousand were landed in 1879 in Albemarle Sound at a single haul of the seine.

### THE MENHADEN.

As this fish is not sold in our markets nor used directly by our people as food, landsmen are hardly aware of its existence, although it is by far the most abundant fish of the Atlantic coast of the United States and, in many ways, one of the most important. We all know that when we eat beef or mutton we are indirectly eating grass, and it is equally true that our bay mackerel and blue fish and all our best and most valued food fishes are only menhaden in another shape.

As food for predaceous fishes the menhaden is a very important inhabitant of our waters, and its commercial value is by no means slight, for nearly $300,000 is invested in the menhaden fishery in our waters, and in a single year the Chesapeake Bay has supplied 92,000,000 pounds of menhaden, which yielded 214,000 gallons of oil, worth $85,000; 10,500 tons of guano, worth $210,000; 212,000 tons of compost, worth $19,000, or an annual product worth more than $300,000.

As this fish is very abundant along our coast from Cape Cod to Florida, it has many local names.

Its Latin name *Brevoortia tyrannus* was given to it in 1802 by B. H. Latrobe, who was the first to recognize it as a distinct species and to give a description of it. As it is a toothless, helpless fish, preyed upon unrelentingly by all the fierce inhabitants of the deep, and hunted and slaughtered by the blue fish and the bonito, in mere sport, until the ocean for miles is smoothed with the oil from the mangled bodies of menhaden, we ask what can have led Mr. Latrobe to give the name *tyrannus*, a name which suggests only aggressive violence, to an inoffensive fish which feeds only upon the microscopic animals and plants of the water. and is absolutely helpless before its innumerable enemies.

The story is most interesting. In southern waters a parasitic crustacean is very frequently found inside the mouth of the menhaden, clinging to its tongue or gill arches, and this animal was also discovered and described by Latrobe and named by him *Oniscus prægustitator*, after the tasters or *prægustitatores*, who were forced by the Roman emperors or *tyranni* to taste all the food prepared for them as a precaution against poisoning.

Among the many local names for the menhaden we find "bug fish" and "bug head," names which obviously have the same derivation.

In our waters it is usually known as the "alewife," in North Carolina the most familiar name is "fat back," on the coast of New York and New Jersey it is usually called the "moss-bunker," while in New England it is called the "pogy" (Maine) or the "poggie" (Mass.) The name menhaden is also in general use along our entire coast, and there is a long list of local names, among which are the following: "Bony fish," "hard head,"

"white fish," "bunker," "old wife," "skipaugh," "pohague," "green tail," and "yellow-tailed shad."

The menhaden is a small fish, seldom weighing a pound, and closely related to the herring and the shad.

They are hatched and pass their winter in some unknown region of the ocean, and they visit our shores from Florida to Cape Cod in the warm months in innumerable multitudes, which enter the bays and sounds and make their way up to the tidal rivers until they meet the fresh water.

They make their appearance in the Chesapeake Bay in the early spring and rapidly become more and more abundant, crowding into the sounds and inlets until the water is fairly alive with them. They herd together like sheep, sometimes swimming round in a circle and sometimes advancing, but always crowding together so closely that a school of menhaden looks at a short distance like a solid body. The statement that the fishes in one of these great schools are packed as closely as sardines in a box is hardly an exaggeration.

They remain in our waters or near our coast so long as the weather is warm, but as winter approaches they gradually work their way out into the ocean and disappear, so that few are found in the bay after the end of November.

While of some value as food for man, it is not sold in the markets of Maryland, and its commercial importance is due to the fact that a valuable oil can be extracted from its flesh by pressure, while the solid remainder is an important constituent of manufactured fertilizers.

It is said that more than a billion of these fishes has been taken in a single year on the eastern coast of the United States, and the total annual product of menhaden oil is considerably greater than the total product of all the American whale fisheries. The oil is used to make paint, to tan leather, and, in fact, for most purposes which are served by linseed oil and whale oil, and it is asserted that much so-called whale oil is actually menhaden oil.

The menhaden is also very valuable as bait for all sorts of marine fishes, and it is preferred to all other bait by the cod, mackerel and halibut fishermen. As some of the most valuable sea fisheries of the Atlantic are under the control of the British Provinces, and as the menhaden is not found north of our own coast, this fish has been made the subject of treaties between our country and Great Britain, and it has held a prominent place in the diplomatic correspondence between our Government and the Dominion of Canada.

There are about sixty establishments for the manufacture of menhaden oil and fertilizers, or "fish factories," as they are called, on the Chesapeake Bay; but as all our navigable waters are free to fishermen

from all parts of the United States, and as the Maryland factories are, in part, supplied from Virginia waters and from the open ocean, it is impossible to treat the subject with reference to State lines.

In shallow water many menhaden are caught in small seines, which are dragged on to the shore; but the chief supply for the factories is taken in the open water in very large seines, which are called purse seines, as they are so constructed that the lower edges may be drawn together like a bag or a purse, under the school of fishes, after this has been surrounded by the seine. As the menhaden usually sinks into deep water when alarmed, the whole school may be lost if the purse fails to close quickly and effectively as soon as it is set. Success in fishing depends upon the efficiency of the purse-string; and as the net is often more than a quarter of a mile long and very heavy, and as it incloses more than an acre of water, and may contain many tons of fish, great ingenuity and skill are required to devise, and to use in small boats at sea, some means which may always be relied upon to draw together the loose edges of this long net at the proper instant, when it is far down under the water and out of sight. There are many ways of doing this, but the most effective one, when the water is deep enough, is to draw the purse line by means of a heavy weight, which is dropped into the water at the proper time, to pull the bag shut as it falls.

An ordinary purse net for deep water is a quarter of a mile long and seventy or eighty feet wide, so that it may hang down below the school of fishes, or, if the water is shallow, may rest on the bottom. Its upper edge is buoyed up by large cork floats, while its lower edge is weighted down by the heavy metal rings through which the purse line is strung. No net which could be used is strong enough to hold the weight of a school of menhaden, for a quarter of a million fishes are occasionally taken at one haul. They are not lifted out of the water, but are simply surrounded, and kept in captivity until they can be dipped up and landed with smaller nets; but even while they are alive and swimming in the water, their resistance, added to the weight of the great net, is an enormous load, and purse net fishing for menhaden can be carried on only by large parties of fishermen.

The net is set from large row boats, but larger vessels such as sloops, schooners and small steam vessels are used in the business, to carry the fishermen and their boats to the fishing grounds, and to receive the fish and transport them to the factory.

The large vessel is the home of the fishermen, and as it cruises about sharp watch is kept from the masthead for the schools of fishes, which, on bright warm days, swim so close to the surface and so densely packed that the surface ripple they produce is visible at a great distance,

and is easily distinguishable, by a practised eye, from the ripple caused by schools of other species.

As soon as the fish are "sighted," one or two of the fishermen put off in small boats to keep watch of them, to study their movements, and to act as "drivers," and to keep them from escaping from the net, as this closes around them.

In the mean time two of the large seine boats, with half of the long seine loaded into the stern of each, are pulled as rapidly as possible after the "driver," who guides them, by signals, to the proper place for casting the net. This is done quickly as the two seine boats are rowed away from each other, around the school, which is headed off by the "drivers."

As soon as the boats meet, certain fishermen, to whom this duty has been assigned, close up the bottom of the net, by means of the purse line, while others begin to pull in the net, and to restrict the fishes to a smaller area.

As soon as they begin this work the large vessel joins them, and, after the fishes are well herded in the centre of the net, this is made fast to the side of the large vessel, and the fishes are baled out with hand nets, or, on the steam vessels, by means of a great dipper of strong netting, which is worked from the yardarm, by means of a hoisting engine.

This steam dipper scoops up several barrels of fishes each time it dips in among them, and it pours them into the hold of the vessel, which is thus rapidly filled with a great silvery mass of shining fishes.

This work must be prosecuted as rapidly as possible, for while the fish do not exert much pressure on the net, so long as they are alive and swimming in the water, they sink as they are killed by the crowding, and as they accumulate at the bottom of the bag they are sometimes heavy enough to drag the whole net from its fastenings and to carry it with them to the bottom.

As soon as the vessel is loaded it carries the fish to the factory, where they are unloaded by a steam hoisting apparatus, which pours them into a great reservoir in the upper story, from which they are drawn off into "cooking tanks," which are placed below the reservoir. A cooking tank holds some fifty barrels or more of fish, and in it they are exposed for half an hour or more to the influence of compressed steam, until they are sufficiently cooked to facilitate the extraction of the oil. Most of the oil is separated from the flesh by the action of the steam, and the rest is forced out by the action of the hydraulic presses.

The commercial importance of the menhaden is great, but its chief value to our people is due to the fact that it is the food of some of our best food fishes.

In his "History of Useful Aquatic Animals," G. Brown Goode estimates the number of menhaden which are destroyed annually on our coast by predaceous animals at a million million of millions, and he says that "it is not hard to surmise the menhaden's place in nature; swarming our waters in countless myriads, swimming in closely-packed, unwieldy masses, helpless as flocks of sheep, near to the surface and at the mercy of every enemy, destitute of means of offense and defense, their mission is unmistakably to be eaten."

### THE BAY MACKEREL OR SPANISH MACKEREL.

This fish, which is often called the Spanish mackerel, is known to our own people as the bay mackerel; and as the Chesapeake Bay furnishes more than 80 per cent. of the two million pounds which are sent to the markets annually, our name for the fish is an eminently proper one.

To the bay mackerel has been awarded, by general consent, the first place among the choice food fishes of the United States, and very extravagant prices are often paid for it. A wholesale rate of $1.00 a pound is not unusual for the first which reach the market in the spring.

It is a summer fish, and it is most abundant during the hot months. The fishing season in the Chesapeake Bay is from about the end of May until the first of September, although a few specimens find their way to the market in every month in the year.

It is a fierce predaceous fish, which, moving in great schools, follows the menhaden from the open ocean into our waters in the early summer and remains here until the first cool weather. In the hot months it is so abundant that its capture becomes the chief occupation of the fishermen.

For many years naturalists supposed that it laid its eggs out in some unknown region of the open ocean in the winter; and it was not until 1880 that Earle discovered that the Chesapeake Bay is its chief breeding ground and that it lays its eggs in the summer.

Each female fish lays an enormous number of eggs, from half a million to a million or more. They are so small that a cubic inch contains twenty thousand of them, and they float at the surface of the water and are driven about by the wind and tide until they hatch, and even after hatching the little fish, which when born is less than a tenth of an inch long, floats for some hours, belly uppermost and almost motionless and helpless, buoyed up by the unconsumed yolk of the egg. As this is gradually assimilated, the little fish grows stronger, and in a few hours it becomes quite active and makes its way down from the surface to deeper water, although it remains throughout life a surface fish, seldom descending to any great depth.

Nothing is known as to the history of these little fishes for their first winter, although mackerel five or six inches long, and probably in their second season, are sometimes found in the bay.

While this fish has long been known and prized as a luxury, it is only within the last fifteen or twenty years that its great abundance in our waters in the summer months has been discovered. The pound nets, which now catch most of the mackerel, were not used in the bay until 1875, and previously to this date little fishing for commercial purposes was carried on in the summer.

It is stated that many of our fishermen had never seen this fish before 1875, and that no purchasers for them could be found in the market of Wilmington, N. C., in 1879. It is said that several thousand pounds which were sent to the dealers in Wilmington in that year were thrown away, as they were thought to be unfit for food.

The bay mackerel are very fierce and powerful fishes, and when they are feeding in summer among the menhaden, in the lower part of the bay, the energy of their movements as they rush here and there among the menhaden is so great that they throw themselves entirely out of the water, and describe long, graceful curves through the air. When leaping out of the water mackerel may be identified at a great distance as they turn in the air and enter the water head first, bending their bodies and describing graceful curves, while most of our other leaping fishes either drop backwards or fall into the water with a splash.

They enter our waters in the early summer, and leave them again in the fall in enormous schools, but after they have entered the bay they scatter and pursue their prey more independently, although they confine themselves to the open water, and seldom enter or even approach the mouths of the rivers. They shun fresh water, and as most of the large rivers enter the bay on its western side they are much more abundant and make their way much further up on the eastern than on the western side.

Their habits and their distribution in our waters are, in these respects, exactly opposite to those of the shad, which come in from the ocean in search of fresh water, and follow the western shore of the bay.

The bay mackerel is a "game" fish, and a fierce fighter for life and liberty, and trolling for mackerel is a most exciting sport. Its activity is so great that it will pursue and snap at a hook dragged at the end of a long line from a steamboat moving at the rate of seven or eight miles an hour. The small schooners which are employed in mid-summer carrying watermelons from the South to our northern cities, keep their trolling lines out as they coast along our low, sandy seashore, and they usually catch enough mackerel and blue-fish to keep their crews supplied with fresh fish.

As the mackerel is a voracious fish, any conspicuous object to attract its attention will serve as bait, and the fishermen usually use a perforated cylinder of white bone or ivory, about three inches long and two-thirds of an inch in diameter. This is strung on the line or on a wire just above the hooks, and when it is dragged through the crests of the waves, at the end of a long line, it resembles a living animal enough to deceive the mackerel.

Another favorite bait for mackerel and blue-fish is a cylinder of lead, cast around a wire, and covered with the skin of an eel, turned wrong side out. These are called "squids," and the fish is supposed to mistake them for these animals; but as they will chase and snap at any small object which is drawn rapidly through the water near the surface, there is no reason to suppose that they mistake the lead for any specific animal.

The chief supply of bay mackerel for our market is caught with gill nets, or is trapped in pounds.

An ordinary gill net is a long loose-meshed net, with floats and sinkers, which is set for a few hours across the path of fishes which run against it, and becoming entangled in the meshes, are held captive until the net is drawn.

Unsuspicious fish which follow regular paths, such as the shad, are caught in abundance in this simple way, but the mackerel has no path, and when in its hunting excursions after other fishes, it meets with an obstruction in its way, it is much more likely to jump over it, or to dart off in another direction than to run its nose into the meshes of a gill net, and in order to catch them it is necessary to use two or three nets and to arrange them in such a way that they shall form a trap so that the fish shall strike and become entangled in one of them as it darts away from the others.

Two parties of fishermen with two boats and two nets usually fish together, and divide the fish equally. One net is set perpendicular to the line of the shore, to turn the fishes out into the deep water. Across the outer end of this a second net is placed, so that it forms the top bar of a capital letter T, with its ends very much turned down, to intercept the fishes which have been turned aside by the leading net.

There are many ways of setting the second net. It may be placed in a circle open in the line of the first net, or it may form a triangle or three sides of a square, or it may be arranged irregularly, or two nets may be used to form the trap, but the purpose to be accomplished is the same in all cases. After the nets have been set upon a good fishing ground they are left for a few hours while the owners busy themselves in line fishing until it is time to take them up.

A pound net is a fixed permanent net, set in essentially the same way, but constructed on a much larger scale, and so arranged that the fishes are not entangled as they are by the gill net, but are conducted into a large trap, or pound, in deep water, where they swim about in captivity until they are caught and removed by the fishermen.

A gill net must be raised within a few hours after it is set, as the entangled fishes soon die. As the fishes in the pound are not entangled in the net they are not exposed to this danger, and they may be left in the pound for days without injury, although a restless, active fish, like the bay mackerel, which does not tamely submit to captivity, but is untiring in its efforts to escape, is apt to find the way out of the pound if left too long.

The pound is a large enclosure of a very complicated pattern, shut in by a fence, which is formed of strong netting stretched upon piles, or posts, which are firmly planted on the bottom. The lower edge of the wall of netting rests on the bottom, while its upper edge is high enough above the surface of the water to keep the fish from escaping by jumping over it at high water.

A straight wall of netting runs out from the shore and turns the fishes which run against it out into the deep water, where it ends just inside the opening into the first or big heart. This opening is about twenty-five feet wide, and it is so large that the fishes enter it fearlessly and swim about until they are stopped by the wall of the heart, when, in their efforts to escape into deep water, they are gradually guided by the walls into the inner heart, and from this, through a narrow opening only a yard wide, into the pound.

This is a rectangular trap, about fifty feet wide, with its bottom, as well as its sides, covered with netting. The bottom is weighted around its edge by sinkers of lead, and it is kept stretched and flat by means of lines, which pass through metal rings at the bottoms of the posts, and are then made fast above water. The netting is so arranged that it may be detached from the posts by the fishermen in their boats, and gradually raised to the surface until all the fishes are drawn together and penned in one corner, where they may be dipped out of the water with hand nets.

The length and size of the pound net depends somewhat upon the depth of the water; and, if the bottom slopes very gradually, a second or even a third is built outside the first. In connection with the pound, a pocket or bag of netting, fifteen or twenty feet square, is constructed as a receptacle for fishes which are to be kept alive for a future market. Besides the bay mackerel, which are the most valuable product of the pound net fishing, great numbers of tailors or blue fish, and of trout, sheepshead, porgies and other food fishes are taken.

The average product for the season of a well constructed pound in a good locality, is said to consist of about 100,000 trout, 40,000 blue fish or tailors, 30,000 bay mackerel, 3,000 porgies, 1,000 sheepsheads, and 10,000 mixed fishes, and of these the bay mackerel represent about thirty per cent. of the money value, which is altogether about $4,000 to each pound for the season.

While most of the fishes for our city markets are now caught in pounds, their use in our waters is quite modern, and when in 1875 a New Jersey fisherman erected a pound in the lower part of the bay, it was torn down by the fishermen, but not before they had learned how to arrange and construct a pound, and had seen enough to convince them of the great profit to be derived from them.

### THE CRAB.

During the warm season, or between April and October, crabs are found, in indescribable abundance, in all the bays and sounds, from the Chesapeake Bay southwards, as well as upon the outer ocean beach, and as they are perfectly at home in water fresh enough to drink as well as in that of the sea, they make their way into all the inlets and rivers and creeks of tide-waters.

In many places they are so numerous that there is no market for them, and even in the Chesapeake Bay it is not unusual to see thousands dragged on to the shore and left to die or to make their way back into the water, by fishermen who have shaken them out of their seines and abandoned them. Further south the fishermen in the channels find their work so much obstructed by the crabs that they trample upon them, or crush them with clubs, to keep them from returning to the water to clog their nets again. In hard storms they are sometimes cast up on to the outer beach in windrows which stretch along the sand for miles, and the abundance of crabs is, perhaps, the most notable characteristic of our coast.

The simplest way to catch hard crabs is to dip them up from shallow water with a small circular net fastened to an iron ring at the end of a long handle; and when crabs abound on shores which are favorable for wading, in water which is not too muddy, a bushel of them may readily be gathered in this way between tides.

For taking them in deeper water a coarse net, stretched on a barrel hoop, and weighted in the centre, is baited and sunk to the bottom with cords, which are sometimes tied to the end of a handle, for raising it again to the surface.

These methods are used by fishermen to catch the crabs with which they bait their fish-hooks, and by summer visitors, who enjoy the novelty of "crabbing," but the men who make a business of catching hard crabs

for the market or for the crab-catching establishments, usually make use of baited lines, as they are thus enabled to reach the crabs in the channels at a distance from the shore.

The crabs are so abundant that competition for food is fierce among them, so that they are always hungry and ready to seize voraciously upon almost any sort of animal food, living or dead. Nothing comes amiss, and pieces of beef, pork and fish are used for bait, as are also pieces of the bodies of the crabs themselves.

As soon as it seizes the bait with its claws the crab tries to carry it off out of the reach of other crabs, and a pull on the line only excites it to cling the closer to the bait, so no hooks are needed, and the crab line is simply a string with the bait tied to one end of it.

Crab fishing requires no experience or skill, and the baited line is tossed into the water to settle to the bottom or to drift with the tide, until a tug at the line shows that a crab has seized it, or until there is reason to suppose that one has found it, for if unmolested by others, it does not try to carry it away, but begins at once to eat it and it may give no perceptible tug at the line until this is pulled in, when the big claws close firmly on the bait, and do not loose their hold until the crab reaches the surface of the water, and not always even then, for often it holds on until it is landed by the line, although it usually abandons the bait and sinks quickly out of sight as soon as it reaches the surface and finds itself in danger.

A hand-net is therefore pushed under it to cut off its retreat, just before it reaches the surface, and as it has by this time usually awakened to a sense of its peril, and as it shows great agility in dodging or scrambling out of the net, it must be landed quickly and skillfully.

As the bait is soon torn to pieces, tough substances are best, and tripe and tendinous pieces of beef or the tough lateral fins of rays and skates are favorites with the fishermen, although the crab itself is not fastidious, and finds the flesh of other crabs very tempting. As crab flesh is very soft and is soon swept away by the tide, or pulled to pieces by the crabs, or sucked off by small fishes, it is not much used, although the crushed claw of a crab is an effective bait.

The outfit of the men who make a business of catching crabs for the canning establishments and for the crab pens, is of the rudest description, and few fishermen are able to carry on their work with such a small capital, as all that is needed is a line and bait, a landing net, which may be made by stretching a piece of the ragged end of an old seine over a piece of barrel hoop bent like a lacrosse racquet, and a rude boat, sometimes made like a rough trough, of a few boards nailed together, but more usually dug out of a log.

A few fishermen have the beautiful canoes for which our waters are famous, shaped by skillful workmen into lines as graceful as those of a cruiser, but usually the "kinew" is like that of a savage, hacked and burned out of a single long narrow log, roughly sharpened at the ends.

Besides the "kinew" and paddle, the outfit consists of a ragged homemade landing-net, and some five or six hundred feet of small rope, to serve as a bottom line, with small lines a foot or so long tied to it at about every two feet.

Pieces of bait are tied to the short lines, and the long line is stretched along the bottom with a float to mark its position, and a stone or anchor of some sort at each end to keep it in place.

The fisherman in his boat visits the line once or twice a day, and pulling up one end passes it over his boat, and drops it to the bottom again; and then, working his way along to the other end, he catches the crabs with his hand-net as they come to the surface, and drops them into his boat, replacing the bait with a new one, if necessary.

The number of crabs which are captured with this simple outfit is astonishing. A fair day's work is about a thousand, and a single fisherman sometimes catches as many as three thousand at one time from a single bottom line. The price which they get for their crabs is very small indeed, but in the vicinity of the canning establishments, where they find a market for all they catch, the fishermen earn good wages and find steady employment for a great part of the year.

The abundance of the crabs in our waters is well illustrated by the fact that we were told, in 1884, by fishermen in the lower part of the Chesapeake Bay, that they were earning from $1.50 to $2.00 a day catching crabs to sell at one cent a dozen or ten cents a bushel; and these men seldom went to their work before sunrise or fished longer than till noon. In fact, most of them were home for the day at ten in the morning.

Of the four million pounds of crabs which are annually sent to the market from our waters, considerably much more than half are captured in this simple, easy way.

As each crab is soft for only a few hours, and as they take no food at this time, and hide themselves under the sand or among the grass of the marshes, when they are about to shed their old shells, the soft crabs are very much less abundant and much harder to find than the hard crabs, and as there is a steady demand for all which can be got to the city markets, the price for soft crabs is always high, although it varies greatly, according to the locality. The crab is very delicate and easily killed while soft, and it is difficult to transport alive and in good order to distant markets, especially in the hot weather, which is the time of abundance.

Where there is no city market or summer resort within reach, the fishermen who supply the local demand receive from ten to fifteen cents a dozen, while in the vicinity of cities and seaside hotels, or at convenient points for shipment, the price sometimes rises to $1.00 a dozen or even more, although from forty-five to fifty cents is perhaps about the average.

The habits of the crab at the time of shedding the old shell are such that they cannot be captured at this time by any of the wholesale methods which are so effective with the hard crabs. Soft crabs do not swim or leave the bottom, so they are not taken in the seines of the fishermen. As the hard crab itself fully appreciates the delicacy of a soft one, they hide from each other as well as from other enemies, and for this reason each one must be sought for separately by the fisherman, and as they do no eating while soft they cannot be tempted by bait.

The local markets are almost entirely supplied by children, who wade through the shallow water of the marshes and flats at low tide, feeling with their bare toes for the crabs, which they pick up with their hands.

When the water is clear enough for the faint outline on the sand which marks the place of the buried crab to be visible, soft crabs are taken in considerable numbers by fishermen who push themselves along by the handles of their nets in small boats over the shoals and sand banks, looking for the marks and dipping up the crabs with their nets. While enough soft crabs for local use may be obtained in these ways, the city markets demand a more constant and abundant supply, and this has led to the establishment of the business of keeping the hard crabs in captivity, in floating pens, until they shed their shells.

Experienced fishermen can tell, even before the crab has been taken from the water, whether it will soon shed its shell, and if this is the case it is saved for sale to the owners of the crab pens, who are, of course, able to pay more for it than for an ordinary hard crab. The female crab sheds her shell within a few days after her eggs are hatched, and as the empty egg-shells are of a dirty brown color, while the unhatched eggs are clear and yellow, a female crab which is likely to shed soon can usually be recognized in this way at a glance. The fishermen are able to judge also from the brilliancy of the colors, a crab that has just shed its shell being much more vividly colored than one which has a new shell growing under the old one. By these and other indications, which are known only to the fishermen, the crabs which are to shed soon may be picked out with great accuracy, and if there is any doubt it can be set at rest by breaking off the tip of one of the small claws, to show whether or not there is a new shell under the old one.

The crabs which are thus selected are placed in the "shedding pen," which is a floating box of laths and loose boards constructed in such a way that the water passes freely through it while the crabs are securely caged. The pen is supported at the sides by two floats of heavy timber, so placed that the upper edge of the pen is raised above the surface of the water enough to keep the crabs from climbing out. The pens are anchored or fastened to stakes in the smooth water of sheltered coves or harbors, at points where they can be guarded and visited at short intervals to fish out the soft crabs.

These are packed in large trays and are placed in such a position that the water which is contained in the gill chambers shall not run out of them, or, as the fishermen say, "out of the mouth," for while they will live for a long time out of water if the gills are kept wet, both soft crabs and hard crabs die quickly if they become dry.

The fishermen receive about a cent a piece for the crabs which are put into the pens, and the average price received by the dealers is probably about thirty or forty cents a dozen.

Soft crabs do not become hard out of the water, but remain soft as long as they can be kept alive, although the shell hardens rapidly under natural conditions.

It is so easy to transport hard crabs alive, and they bear the journey so well that there is no part of our State where they cannot be obtained; and as there is, therefore, little demand for canned crabs, few of our people, except those who are directly interested, know of the existence of the crab-canning industry, although it presents a field for the profitable employment of capital which is capable of great extension, and puts within the reach of distant and less fortunate people the superabundance of our waters.

As soon as the living crabs are received at the canning establishment they are loaded into wooden cars of open slat-work, which, when filled, are pushed into a steaming apparatus, when the steam is turned on, and the crabs exposed to it until they are cooked enough to cause the meat to separate readily from the shell. The shells are then broken open and the flesh is picked out to be packed in cans, while the refuse and the pieces of shell, with the exception of the upper shell, are utilized as a fertilizer.

After each can has been filled with the flesh and closed up it is again cooked for an hour or two in a bath of boiling water. It is then opened to permit the vapor to escape, and is then sealed up again and cooked once more in boiling water.

If these operations are carried on with care and good judgment the contents of the cans may be kept for an indefinite time without any bad

effect, and canned crabs from the Chesapeake Bay now find their way to the most distant quarter of the globe.

When the crabs are opened after the first steaming the upper shells are carefully removed and thoroughly cleaned, and when the cans are packed for shipment a sufficient number of these shells is put into each package to permit its contents to be served in the shell after the manner which all Marylanders know to be the only true and legitimate way of placing "deviled" crabs upon the table.

The supply of crabs in our waters does not as yet show any signs of exhaustion, but the history of the lobster fisheries proves that the extension of the canning industry and the increased demand for crabs which this will produce, must ultimately exhaust the supply. Measures for the preservation and protection of the crabs must some time be adopted, but fortunately it is not at all difficult to state what these means should be.

The mother crab carries her eggs about with her until they are hatched, and they are well protected by the hard shell of the brood chamber, and are also guarded from danger by the mother crab, whose maternal instincts are well developed. A few crabs with eggs ready to hatch are found early in the spring and late in the fall, but most of the eggs are hatched in the hot months of July and August, and if, when protection becomes necessary, the taking of hard crabs for the market and for the canning establishments were prohibited in these months, enough eggs would be hatched each summer to prevent any great decrease in their numbers until the consumption of crabs become very much greater than it is now. As most of the female crabs migrate into the deep water at the lower end of the bay in mid-summer, their preservation by a closed season will require that Maryland and Virginia shall act for this purpose in concert.

The proprietors of the canning establishments assert that this matter may safely be left to their own far-sighted interest in the permanent maintenance of the business, and that they do not make use of the female crabs with eggs. Observation shows, however, that hundreds of crabs with eggs are loaded into the cars and run into the steaming apparatus and cooked every day, and while it is possible that their flesh is not put into the cans, but is thrown away, the effect is, of course, the same.

As the female crab does not shed her shell until the eggs are hatched, the capture of soft crabs and of those which are ready to become soft can have little effect upon their numbers; and as the extension of the business of keeping them in "shedding pens" will increase the market supply of soft crabs, advantage alone will result to the community.

### THE DIAMOND-BACK TERRAPIN.

This small but expensive animal fills such a prominent place among the luxuries for which our State is famous that a few words upon the way our market is supplied will not be out of place, although only a small part of our supply comes from our own waters.

The diamond-backed terrapin, Malacoclemmys palustris, is found along our entire eastern coast from southern New England to Texas, wherever there are salt marshes, but it is most abundant in the low half-submerged country which fringes most of the sounds and tidal rivers from the Chesapeake Bay southward.

At one time these animals were so abundant that they could be seen sunning themselves on the sand-bars and sand-flats upon every warm day. Holbrook says they are so prolific that their numbers appear undiminished, notwithstanding their great destruction, but at present they are by no means abundant, and no one who does not devote himself to their pursuit is at all likely to meet with a single specimen.

The streams along the salt marshes of Maryland still furnish a few, but the supply for our market comes for the most part from southern waters—from the vicinity of Norfolk and from the eastern shore of Virginia and from still further south.

The habits of the diamond-back are much like those of our familiar pond terrapins. They are at home both on land and in the water, and during the summer months they are active and alert, wandering in search of their food, which consists of fish, crabs, marsh plants and algæ, and in fact of most of the animal and vegetable food which the marshes afford.

Early in the summer the female comes up at night on to a sandy shore or bar above the water and scoops out a shallow nest for her eggs, and the newly hatched young live for a time on land. As soon as cold weather approaches, the terrapin buries itself in the mud beyond the reach of frosts and sleeps until spring. During its active life in summer it cannot stay under water very long without coming to the top for fresh air, and it drowns like any other breathing animal when it is kept under water, but in its winter sleep breathing almost ceases, and the animals often bury themselves in the mud under water.

The methods of catching them vary according to the season. In summer a few are gathered by men and boys, who wade through the marshes and shallow waters, catching them in their hands or dipping them up with hand nets. At the present day the return is too scanty to support a child, and this method of catching terrapins is only the occupation of idle hours, for we must not estimate the earnings of these summer fishermen by the price which the city dealers charge their customers. There is no demand for terrapins in the summer, and those which are

caught in this way are sold at once to dealers who are able to wait until winter for a market, and the prices paid to the captors range from less than a dollar a dozen to as much, perhaps, in very favorable cases, as ten dollars a dozen.

Notwithstanding its proverbial indolence, the terrapin when at home in or near the water is a most active animal, wary and skillful at hiding and escaping, and the demand has led to many improved methods of catching them.

In North Carolina dogs are trained to hunt along the shores of the creeks for the tracks of terrapins which have come out of the water and to follow the trails into the marshes until they find the animals. The hunters also visit the sandy shores and bars at night with torches during the breeding season, and capture the terrapins as they come up to make their nests.

Terrapins are often caught by fishermen in their seines, and traps also are used, made after the fashion of a lobster pot, of coarse netting stretched over hoops, with a funnel-shaped opening at each end. These traps are baited with pieces of fish, and are set in favorable spots, but as a terrapin caught in a trap under water would drown, they are placed in shallow water or are fastened to stakes in such a way that part of the trap is above water to furnish a breathing space.

Those which are sent to market in the winter find a ready sale at high prices, and there are many ways of finding them in their burrows in the mud.

At Beaufort, North Carolina, the dry grass of the marshes is lighted after the terrapins have hid themselves for the winter, and as the ground grows warm they are awakened and come out of their burrows, when they are captured without difficulty.

Most of the supply is captured by means of terrapin "drags," constructed somewhat like a naturalist's dredge. In summer the animals are much too active to permit themselves to be caught in this way, but as colder weather sets in they become more helpless, and the drag is then an effective collector. It consists of a coarse bag, with large meshes which permit the mud to flow through them and to be washed away, and of a frame which forms the mouth of the bag and keeps it open. The lower side of this frame is a heavy bar of iron three or four feet long, set with large strong iron teeth, which rake the mud and scoop up the buried terrapins.

In the far south, where the winter's sleep is not perfect, they gather, in cold weather, in the mud at the bottoms of deep holes in the creeks, and they are captured in large seines, made for the purpose, four or five hundred feet long and eighteen or twenty wide, with coarse meshes.

One end of it is made fast to a stake, and it is then set, from a boat, in a circle, and the two ends are then brought together and rapidly drawn in to the boat. During the whole process the fishermen rap upon the sides or bottom of the boat with oars or sticks, as it is said that this noise causes the terrapins to rise from the bottom, and prevents them from diving under the net.

The terrapins which are gathered in the summer are kept in pounds, or inclosed pens, until winter, and are fed with fish and crabs. The high price and the gradual disappearance of the terrapins have led to efforts to rear them in inclosed pens, from the eggs, but these pens must be so large, to afford all the conditions which are necessary, that the protection of the eggs and young animals from their enemies is very difficult, and, as they grow so slowly that they are not ready for market for some six years, few persons have attempted to rear them.

Our waters contain many species of terrapins which, while they are not esteemed by our people, are elsewhere used as food, and it is an open secret that some of them are sometimes served as the real diamond-backs.

Small green turtles, or chicken turtles, as they are called, are quite frequently taken by fishermen in their nets, in the lower counties of Maryland, for while this animal is an inhabitant of the sea, it delights in the mouths of rivers, and often works its way inland to a great distance. It is a delicious article of food, but its occurrence in our waters is too irregular and infrequent to give it an established place among our resources.

# CHAPTER VIII.

## THE OYSTER AND THE OYSTER INDUSTRY.

### THE OYSTER.

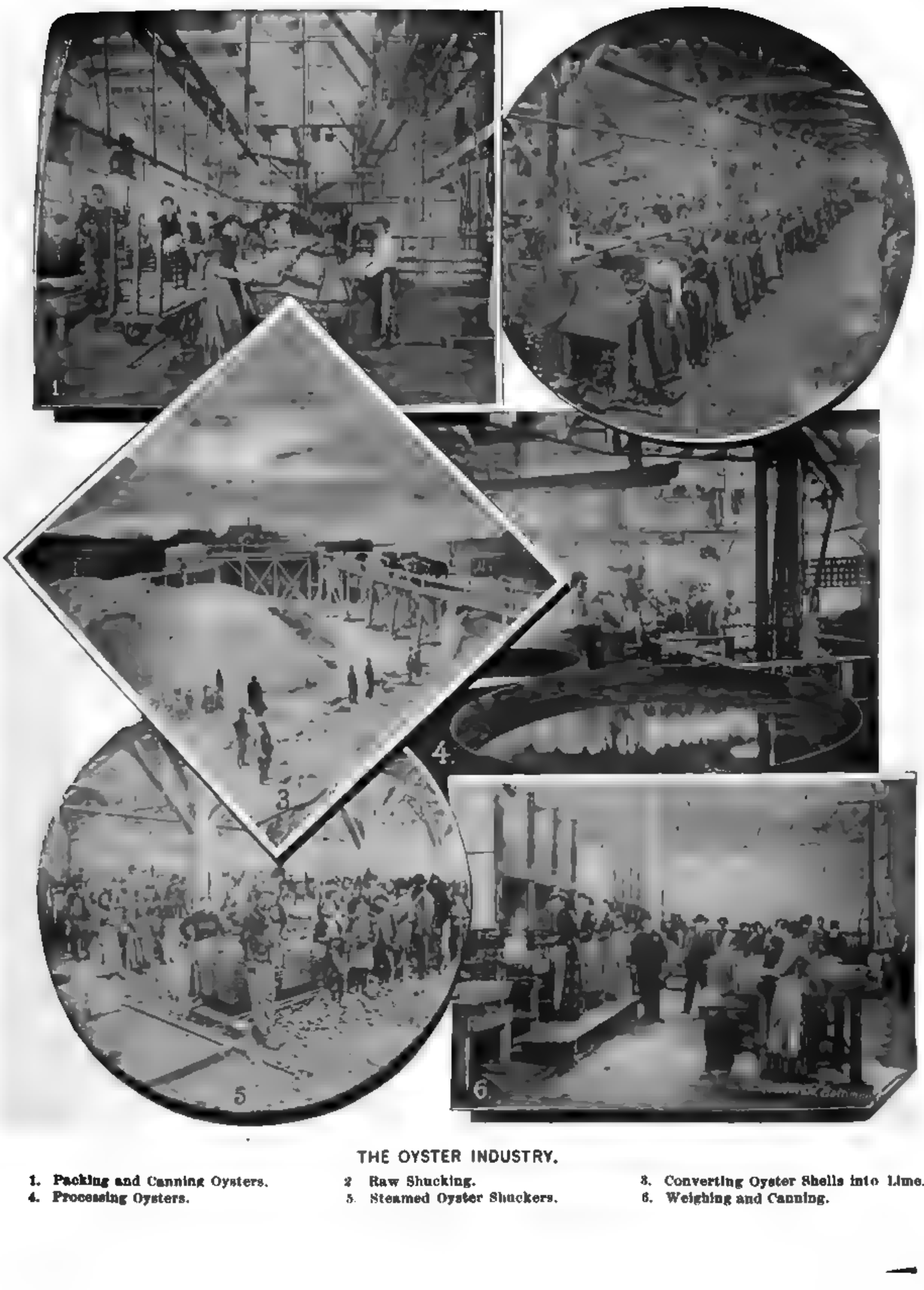
We must give to the oyster a prominent place in the list of our natural resources. The vast number of oysters which the Chesapeake Bay has furnished in the past is ample proof of its fertility, but it is difficult to give any definite statement as to the value of the oyster beds in past years, although there is good reason for believing that since the business of packing oysters for shipment to the interior was established, in 1834, nearly four hundred million bushels of oysters have been taken from our waters.

This inconceivably vast amount of delicate, nutritious food has been yielded by our waters without any aid from man. It is a harvest which no man has sown; a free gift from bounteous nature.

The fact that our waters have withstood this enormous draft upon them, and have continued for more than half a century to meet our constantly increasing demands, is most conclusive evidence of their fertility and value, and the citizens of Maryland and Virginia might well point with pride to the boundless resources of our magnificent bay.

Four hundred million bushels of oysters is a vast quantity, and it testifies to the immeasurable value of our waters; but every one who has studied the subject, either on its scientific side or in the light of the experience of other countries, knows that the harvest of oysters from our bay has never, even at its best, made any approach to what it might have been if we had aided the bounty of nature by human industry and intelligence. The four hundred million bushels is the wild crop which has been supplied by nature, without any aid from man, and it compares with what we might have obtained from our waters in about the same way that the nuts and berries which are gathered in our swamps and forests compare with the harvest from our cultivated fields and gardens and orchards.

When we have learned to make wise use of our opportunities, and when the oyster-beds of the bay have been brought to perfection, a harvest of four hundred million bushels in half a century will not be regarded as evidence of fertility.



THE OYSTER INDUSTRY.

1. Packing and Canning Oysters.
2. Raw Shucking.
3. Converting Oyster Shells into Lime.
4. Processing Oysters.
5. Steamed Oyster Shuckers.
6. Weighing and Canning.

It will take many years of labor to bring the whole bay under thorough cultivation, and it will require a great army of industrious and skillful farmers, and great sums of money; but the expense and labor will be much less than an equal area of land above water requires; and while it may be far away, the time will surely come when the oyster harvest each year will be fully equal to the total harvest of the last fifty years, and it will be obtained without depleting or exhausting the beds, and without exposing the laborers to hardships or unusual risks.

This is not the baseless speculation of an idle fancy. Our opportunities for rearing oysters are unparalleled in any other part of the world, and in other countries much less valuable grounds have by cultivation been made to yield oysters at a rate per acre which, in our own great beds, would carry our annual harvest very far beyond the sum of all the oysters which have ever been used by the packers of Maryland and Virginia.

This is capable of proof by evidence from other countries, but it may be proved with equal conclusiveness, by the natural history of the oyster.

The Chesapeake Bay is one of the rich agricultural regions of the earth, and its fertility can be compared only with that of the valleys of the Nile and the Ganges and other great rivers. It owes its fertility to the same causes which have enabled the Nile valley to support a dense human population for untold ages without any loss of fertility, but it is adapted for producing only one crop, the oyster.

All human food is vegetable in its origin, and whether we eat plants and their products directly, or use beef, mutton, fish, fowls or eggs for food, we are carried back to the vegetable kingdom; for if there were no plants all animals would starve at once. Every one knows that this is absolutely true of all terrestrial animals, and all naturalists know that it is equally true of sea food. The blue-fish preys on smaller fishes; many of these on still smaller ones; these, in their turn, on minute creatures; these upon still smaller animals, and these pasture on the microscopic plants which swarm at the surface of the ocean. However long the chain may be, all animals, those of the water as well as those of the land, depend upon plants for food, although most of the vegetable life of the ocean is of such a character that its existence is known to naturalists alone.

If there were no plants all animals would starve, and no animal is a direct food producer, for it can furnish nothing except what it has got from plants. Now, for the purpose of animal life, a small plant is as effective as a large one, for however small it may be it still has the power, which is possessed by no animal, to gather up the inorganic matter of the earth, and to turn it into vegetable matter fit for the

nourishment of animals. Microscopic plants can do this work as well as great forests of lofty trees, provided they are numerous enough; and size counts for nothing.

Every one knows that the sea is rich in animal life; that it contains great banks covered with cod and haddock, miles and miles of water crowded full of mackerel and herring; and great monsters of the deep, such as the whales and sharks. To the superficial observer the vegetation of the sea appears to be very scanty, and, except for a fringe of seaweeds along the shore, the great ocean seems, so far as plant life is concerned, to be a barren desert. If it be true that all animals depend on plants for their food, the vegetation of the ocean seems totally inadequate for the support of its animal life.

The microscope shows that its surface swarms with minute plants, most of them of strange forms, totally unlike any which are familiar, and having nothing in common with the well-known trees and herbs and grasses of the land, except the power to change inorganic matter into food which is fit for animals.

Most of these plants are so small that they are absolutely invisible to the unaided eye, and even when they are gathered together in a mass, it looks like slimy, discolored water and presents no traces of structure. They seem too insignificant to play any important part in the economy of nature, but the great monsters of the deep, beside which the elephant and the ox and the elk are small animals, owe their existence to these microscopic plants.

Their vegetative power is wonderful past all expression. Among land plants, corn, which yields seed about a hundredfold in a single season, is the emblem of fertility, but it can be shown that a single marine plant, very much smaller than a grain of mustard seed, would fill the whole ocean solid in less than a week, if all its descendants were to live.

This stupendous fact is almost incredible, but it is capable of rigorous demonstration, and it must be clearly grasped before we can understand the life of the ocean. As countless minute animals are constantly pasturing upon them, the multiplication of these plants is kept in check, but in calm weather it is no rare thing to find great tracts of water many miles in extent packed so full of them that the whole surface is converted into a slimy mass, which breaks the waves and smooths the surface like oil. The so-called "black water" of the Arctic and Antarctic oceans, the home and feeding ground of the whale, has been shown by microscopic examination to consist of a mass of these plants crowded together until the whole ocean is discolored by them. Through these seas of "black water" roam the right whales, the largest animals on earth, gulping at each mouthful hundreds of gallons of the little mollusca and crustacea which feed on the plants.

In tropical seas ships sometimes sail for days through great floating islands of this surface vegetation, and the Red Sea owes its name to the coloration of its water by great swarms of microscopic plants which are of a reddish tinge. The plant life of the ocean is ample for the support of all its animal life, just as the vegetation of the land gives a maintenance to all terrestrial animals.

The source of the food of animals is the vegetable world. What is the source of the food of plants?

Most of it consists of mineral matter, derived from the crust of the earth; but before this can be used by plants it must be dissolved in water. The solid rocks cannot maintain life until they have been ground down and dissolved, and, in the form of frost and rain, water is continually breaking down and wearing away the hard rocks and carrying the fragments down to lower levels to form the fertile land of the hillsides and valleys and meadows. As the roots of the plants penetrate this loose material they gather up the mineral food which is dissolved by the rain and convert it into their own substance, and as their leaves fall and their trunks decay, the decaying vegetable matter gradually builds up the leaf-mould and meadow-loam which are so well adapted for supporting vegetable life. Each year, however, the heavy rains wash great quantities of this light, rich soil into the rivers, which at times of flood cut into their banks and carry the arable land, which has been built up so slowly, down to lower levels, until at last it finds its way to the ocean and is lost, so far as its use to man is concerned.

In a long, flat river-valley it may be arrested for a time, so that man may make use of it, but its final destination is the ocean, and as this has already been enriched by the washings through untold ages, all that is most valuable for the support of life is now dissolved in its waters, or deposited upon its bottom, where man can make no use of it.

We love to dream of the shipwrecked treasures which lie among the bones of the sailors on the sea-bottom; of the galleons sunk and lost with their precious cargoes of bullion and jewels from the treasure-chambers of the Incas and the palaces of Asia; but all these, and all the "gems of purest ray serene, the dark, unfathom'd caves of ocean bear": all the thousands of tons of gold and silver which, as chemists tell us, the sea holds dissolved in its waters—all these are as nothing when compared with these precious washings from the land of all that fits it for supporting life.

Man will some time assert his dominion over the fishes of the sea, and will learn to send out flocks and herds of domesticated marine animals to pasture and fatten upon the vegetable life of the ocean and to make its vast wealth of food available, but at present we are able to do little more than to snatch a slight tribute from the stream of nutritive

material which is flowing down into the ocean, as it comes to temporary rest in the valleys of our great rivers.

Every one knows the part which these great river-valleys have played in human civilization. In the valley of the Nile, of the Tigris, and of the Ganges we find the most dense populations; here were the great cities of the past; here agriculture and architecture were developed, and here art, literature and science had their birth.

We owe to the great river-valleys, where the natural fertility of the soil has lightened the struggle for bread and has afforded leisure for higher matters, all that is most distinctive of civilized man.

The Chesapeake Bay is a great river-valley; not as large as that of the Nile or Ganges, but of enough consequence to play an important part in human affairs, and to support in comfort and prosperity a population as great as that of many famous states. It receives the drainage of a vast area of fertile land stretching over the meadows and hillsides of nearly one-third of New York, and nearly all of the great agricultural States of Pennsylvania, Maryland and Virginia. The most valuable part of the soil of this great tract of farming land, more than forty million acres in area, ultimately finds its way to the bay, in whose quiet waters it makes a long halt on its journey to the ocean, and it is deposited, all over the bay, in the form of fine, light, black sediment, known as oyster-mud.

This is just as valuable to man, and just as fit to nourish plants, as the mud which settles every year on the wheat fields and rice fields of Egypt. It is a natural fertilizer of inestimable importance, and it is so rich in organic matter that it putrefies in a few hours when exposed to the sun. In the shallow waters of the bay, under the influence of the warm sunlight, it produces a most luxuriant vegetation; but with few exceptions, the plants which grow upon it are microscopic and invisible, and their very existence is unknown to all except a few naturalists. They are not confined like land plants to the surface of the soil, and while they are found in great abundance on the surface of the mud, they are not restricted to it, for their food is diffused in solution through the whole body of water, and the mud itself is so light that it is in a state of semi-suspension, and the little plants have ample room among its particles.

On land, the plant-producing area is a surface, but the total plant-producing acreage of the bay is many times greater than the superficial area of its bottom.

As the little plants are bathed on all sides by food, they do not have to go through the slow process of sucking it up through roots and stems, and they grow and multiply at a rate which has no parallel in ordinary familiar plants, and would quickly choke up the whole bay if they

were not held in check; but their excessive increase is prevented by countless minute animals which feast upon them and turn the plant substance into animal matter, to become in their turn food for larger animals. As a matter of fact, they are not very abundant, but there is no difficulty in finding them in any part of the bay, by straining the water through a fine cloth. In this way we obtain a fine sediment, which is shown by the microscope to consist almost entirely of them.

The variety of these microscopic plants and animals is very great, and a series of large volumes would be needed to describe the microscopic flora and fauna of the bay. Most of them occur in other waters as well, but many are peculiar to the bay, which is an exceptionally favored spot for their growth.

The exploration of this invisible world with a microscope is an unfailing delight to the naturalist, but at first sight it seems to have no particular bearing on human life. The ability to turn inorganic mineral matter into food for animals and for man does not depend on size, and in this respect the microscopic flora of the bay is as efficient as corn or potatoes, but infinitely more active and energetic.

In the oyster we have an animal, most nutritious and palatable, especially adapted for living in the soft mud of bays and estuaries, and for gathering up the microscopic inhabitants and turning them into food for man.

The fitness of the oyster for this peculiar work—for bringing back to us the mineral wealth which the rivers steal from our hillsides and meadows—is so complete and admirable, so marvellous and instructive, that it cannot be comprehended in its complete significance, without a thorough knowledge of the anatomy and embryology of the oyster.

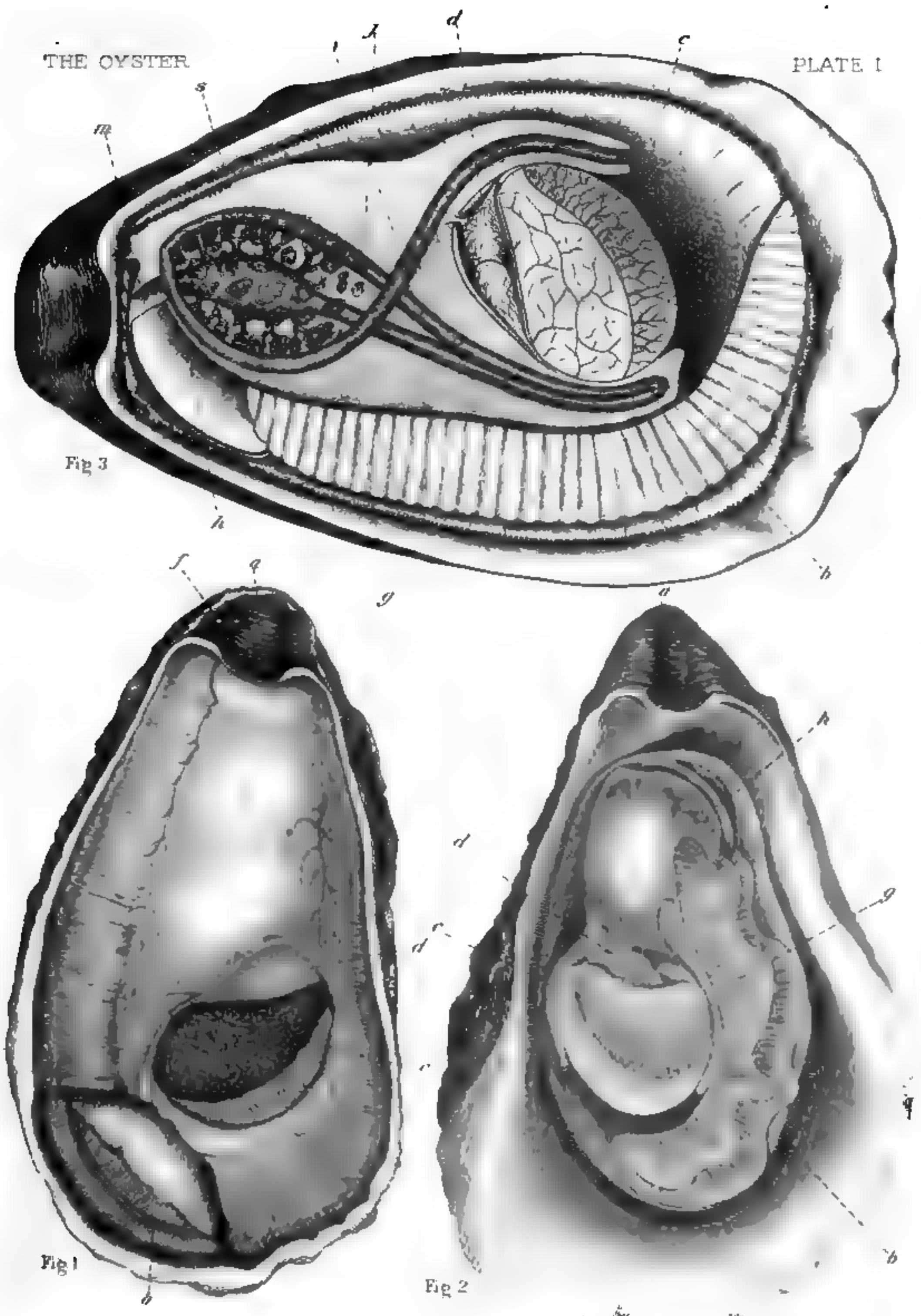
The inestimable value of our inheritance in the black mud of the bay has been pointed out, and it now remains to show that the oyster is an animal which has been especially evolved for life in this mud, and that through its aid we may make our inheritance available. A thorough knowledge of the oyster will teach much more than this. It will show the capacity of the oyster for cultivation, and it will also show why its cultivation is necessary, and why our resources can never be fully developed by oysters in a state of nature. We have never enjoyed the hundredth part of our advantage, nor can we ever do so if we continue to rely upon nature alone; and this fact, which has been proved again and again by statistics, is perfectly clear to any one who knows what an oyster is, and what are its relations to the world around it. As its world is chiefly microscopic, no one can penetrate into the secrets of its structure and history without training in the technical methods of the laboratory; and business contact with the oyster cannot possibly, with any amount of experience, give any real insight into its habits and mode of life.

## THE ANATOMY OF THE OYSTER.

The most prominent fact in the organization of the oyster is its shell. Its body is shut in between two long concave stony doors, which are made of limestone, and are fastened together at one end, somewhat in the same way that the covers of a long, narrow check-book are bound together at the back. One of these shells, the flat one, is on the right side of the body, and the other, which is much deeper, on the left. When oysters are fastened to each other or to rocks, the left shell is attached, and the oyster lies on its left side. When it is at home and undisturbed its shell is open, so that the water circulates within it, but when disturbed it shuts its shell with a snap, and is able to keep it firmly closed for a long time. The snapping drives out the water, together with any irritating substances which may find their way in, and on the natural beds the oysters snap their shells shut, from time to time, for this purpose. The snapping is popularly called feeding, but it is nothing of the kind. It serves to drive food out instead of taking it in, and so long as the shell is open a gentle current of water is drawn in by a delicate piece of microscopic machinery, which will be explained later on. The food of the oyster consists of invisible organisms which float in the water and are drawn in with it.

The apparatus for opening and closing the shell is very interesting. If you were to open a check-book, and were to wedge a piece of rubber between the leaves, close to the back, it would form a spring, which would be squeezed by closing the book, and would open it again when released. A book with such a spring would be open at all times, except when forcibly closed. Wedged in between the two shells of the oyster, at their narrow ends, is an elastic pad, the hinge-ligament, which acts in exactly the same way. When the shell is forcibly closed the ligament is squeezed, and it expands when it is released and thus throws the free edges of the shells apart. The ligament is not alive. It is formed, like the shell itself, as an excretion from the living tissues of the oyster, and its action is not under the control of the animal. It keeps the shell open at all times, unless it is counteracted, and for this reason an oyster at rest and undisturbed, or a dead oyster, always has its shell open.

The active work of squeezing the passive ligament and closing the shell is done by a large, powerful muscle, made up of a bundle of contractile fibres which run across the body between the shells, and are fastened to their inner surfaces over the dark-colored spots which are always to be seen on empty oyster shells. The muscle is known to oyster-openers as the heart, and they assure you that when this is cut, the vital point, the seat of the oyster's life, is reached and that a wound here causes instant death. This is of course an error, and cutting the muscle causes the shell to open simply because it destroys the animal's




THE ANATOMY OF THE OYSTER.

A Hoen & Co Lithocaustic, Baltimore

power to close it; but a fresh oyster on the half-shell is no more dead than an ox which has been hamstrung. Any one who has struggled with an oyster-knife to force open an obstinate thick-shelled specimen, knows the great strength of this little muscle. It is said that when fishermen are caught by the feet or hands between the shells of the giant clam of the Pacific, they never escape alive, but are held, as if by a vise, until the tide rises and drowns them; but firmly as the muscle of the oyster holds the shell together, a little skill is all that is needed to overcome it.

The work of closing the shell is done by the muscle, but we must go very much farther in the study of the oyster in order to find why it closes. It is opened by the mechanical properties of the ligament, but the cause of its closure cannot be the mechanical properties of the muscle, for these are just the same whether it is active or at rest. Careful investigation shows the existence of a wonderful apparatus, consisting of the muscle which does the work, of nerves which connect the muscle with the brain, of other nerves which run to the more exposed parts of the oyster's body, and of sense organs which are connected with the ends of these sensory nerves, and these serve to put the animal into communication with the external world. Though very much simpler, the mechanism is essentially like that of our own bodies. The oyster's shell is lined by a fleshy *mantle*, which is fringed by a border of dark-colored sensory tentacles, which are partially exposed when the shell is opened. The approach of danger is perceived by these organs, which transmit a sensation of danger along the sensory nerves to the brain, and this in turn sends a nervous discharge along another set of nerves to the muscle, and this shortens under the stimulus and pulls the shells together and holds them fast.

The muscle is attached to the shell at some distance from the hinge, in order that it may have leverage and work to advantage; and it must therefore be able to move as the shell grows, for in an oyster three inches long its area of attachment is outside what was the extreme border of the shell when this was only an inch long. The muscle travels by the addition of new fibres on its outer surface, together with the absorption and removal of those on its inner border. As it moves, the old impression on the shell is gradually covered up by new deposits of lime, and in an empty shell it may be traced for some distance up towards the hinge, when it gradually becomes more faintly marked, as the layers of new shell grow thicker. A very good idea of the way the shell grows and keeps pace with the growth of the body, may be gained by the careful examination of the muscular impression on its inner surface. Every fool knows why a snail has a house, but the king could not tell how an oyster makes his shell. We can now give a satisfactory answer to what will not,

I hope, be thought a fool's question: "Canst tell how an oyster makes his shell?"

The shell, on each side of the body, is lined by a thin, delicate, fleshy fold, the mantle; which may be compared to the outer leaf on each side of the check-book, next the cover. It lies close against the inside of the shell, and forms a delicate living lining to protect the body and the gills, and it is also the gland which makes the shell.

At all times, while the animal is alive, it is laying down new layers of pearl over its whole inner surface, and as each successive layer is a little larger in area than the one before, the shell increases in size as well as in thickness, and the hinge, where there are many layers, is very thick, while the edge, which is new, is quite thin and sharp. Each layer is very thin, hardly thicker than a sheet of tissue paper, but the deposition of layer on layer gradually results in a solid box of stone.

Shells which grow on rough, irregular surfaces conform to their shape as perfectly as if they had been moulded into the ridges and furrows, like soft clay. An oyster growing in the neck of a bottle takes the smooth, regular curve of the glass, and on the claw of a crab an oyster shell sometimes follows all the angles and ridges and spines, as if it were made of wax instead of inflexible stone. Its apparent plasticity and the mouldings of its surface are due to the flexibility of the soft edge of the mantle. When the oyster is at rest this protrudes a little beyond the edge of the shell, so that each new layer is a little larger in area than the last one. The soft mantle readily conforms to the shape of the body to which the oyster is fastened, and however irregular this may be, the new shell takes its shape and closely adheres to it, because the new deposits are laid down directly upon it.

You will see from this account the error of the current belief that an old oyster cannot fasten itself. Since the adhesion takes place around the growing edge, an oyster may fasten itself at any time, and clusters of oysters are often found with their shells soldered together near their tips. This can of course only occur after they are well grown.

Oysters are able to close up broken places in their shells, and most molluscs sometimes absorb and rebuild parts of the shell. If any foreign body gets in between the shell and the mantle, shelly matter is deposited upon it. The pearls of the pearl oyster are formed in this way. Some small particle, such as a grain of sand, works its way in, and forms a nucleus which is gradually covered by layer after layer of pearl. The brilliant lustre, as well as that of mother-of-pearl, which is nothing but polished shell, is due to the interference of light caused by the laminated structure.

A series of microscopic specimens of stages in the growth of the shell may be obtained, and made to exhibit the whole history of the process,

if we put into the shells of a number of oysters thin glass circles, such as are used to cover microscopic specimens, and then return the oysters to the water and leave them undisturbed until new shell begins to be formed on the glasses. These may then be taken out and studied under the microscope.

At the end of twenty-four hours the glass will be found to be covered by a transparent, faintly brown film of thin gummy deposit, which exhibits no evidences of structure, and contains no visible particles of lime, although it effervesces when treated with acids, thus showing that it contains particles too small to be visible with a microscope. The gummy film is poured out from the wall of the mantle, and in forty-eight hours it forms a tough leathery membrane fastening the glass cover to the inside of the shell. At about this time the invisible particles of lime begin to aggregate and to form little flat crystals, hexagonal in outline, and about $\frac{1}{2500}$ of an inch long. The crystals grow and unite into little bundles of groups, and new ones appear between the old ones, until, at the end of six days, the film has completely lost its leathery character and has become stony, from the great amount of lime present in it. In three or four weeks the glass cover is completely built into the shell and can no longer be seen, and its place is only to be traced by its form, which is perfectly preserved upon the inner surface of the shell. When broken out it is found to be coated with a thick plate of white shell, which is beautifully smooth and pearly upon the side nearest the glass.

Microscopic examination of this plate shows that it is made up of an immense number of minute crystals, packed and crowded together into a solid mass, without any regular arrangement. These observations show that the new layers are thrown off in the form of a gummy excretion from the mantle, with the lime in solution, and that the particles unite with each other and form crystals while the gum is hardening.

The oyster obtains the lime for its shell from the water, and while the amount dissolved in each gallon is very small, it extracts enough to provide for the slow growth of the shell. It is very important that the shell be built up as rapidly as possible, for the oyster has many enemies continually on the watch for thin-shelled specimens. In the lower part of the bay we may lean over a wharf and watch the sheepshead moving up and down with their noses close to the piles, crushing the shells of the young oysters between their strong jaws and sucking out the soft bodies; the juices from the bodies of the little oysters stream down from the corners of their mouths, to be swept away by the tide.

The sooner a young oyster can make a shell thick enough to resist such attacks the better, not only for the oyster but for us also; for once past this dangerous stage of development, there is a prospect that it may

live to complete its growth; although it is true that the fully grown oyster has many enemies which either crush the shell or pull it apart, or bore holes through it in order to reach the delicate flesh within. At all times in its life its chance of survival is greatest when the supply of lime is so abundant that it is able to construct rapidly a thick, massive shell. The rate of growth of any animal must be regulated by the supply of that necessary ingredient of its food which is least abundant, as may be illustrated in many ways. To run a locomotive the engineer must have fuel and water and oil. He needs very little oil, but that little he must have. After this is gone, an unlimited supply of fuel and water will not help him. He must have oil or stop. So, too, if he have plenty of oil and fuel, but only a little water, he must stop as soon as the water fails. In general, the amount of work he can do is determined by his supply of that of which he has least. If food in general is abundant while there is a scarcity of one necessary article, growth can take place only so fast as the scarce article can be procured. A superfluity of other things is of no value, for it cannot be utilized.

There are many reasons for believing that the growth of oysters is limited by the supply of lime; and that all the other necessary ingredients of their food are so abundant that an increase in the supply of lime would cause more rapid growth, greater safety from enemies, and an increase in the number of oysters. All kinds of shelled molluscs grow more rapidly, and reach a greater size, and have stronger and thicker shells in coral seas, where the supply of lime is unlimited, than in other waters. In some parts of the Bahamas the large pink-lipped conch, the shell which we often see for sale in the fruit stores of Baltimore, is so abundant that whole islands, large enough to be inhabited, are entirely made up of the broken fragments of these beautiful shells, which have been pounded to pieces and heaped up by the waves.

The fresh-water mussels of our western rivers are very large in limestone regions, and so abundant that the bottom is almost paved with them, while in another river, perhaps only a few miles away, but flowing through a country where there is little lime, they are few and very small, with thin, fragile shells.

If you turn over the old bones which are sometimes found in the woods and fields, you will nearly always find a number of snails which have been drawn to them for the sake of the lime.

In order that the oyster may grow rapidly, and may be securely protected from its enemies, it must have lime. The lime in the water of the bay is derived in great part from the springs of the interior, which, flowing through limestone regions, carry some of it away in solution, and this is finally carried down the rivers and into the bay. Some of it is no doubt derived from deposits of rock in the bed of the ocean, and

some from the soil along the shores. Now, the geologist will tell you that all the limestone rock has at one time been part of the bodies of living animals. Limestone is either old reefs of fossil coral, or beds of extinct shells, or the skeletons of other animals and plants which lived in remote ages and stored up the lime from the ocean at a time when it was more abundant than it is now. The oyster gets the greater part of its lime from these sources in this roundabout way, but a very considerable portion is obtained in a much more direct way, by the decomposition of old oyster shells.

We save up egg shells to feed laying hens, but we waste our oyster shells in every possible way, and treat them as if they were of no value. Some are burned for lime, some are used for making roads and wharves, some are used for filling in low land, some are dumped in great piles at convenient spots in the bay, where they sink far down into the mud and are lost.

There is another far more important reason why they should be returned to the beds, but their value as food for the oyster is very great, and this alone should lead us to return them to the beds. On the oyster-beds an old shell is soon honeycombed by boring sponges and other animals, and as soon as the sea-water is thus admitted to its interior, it is rapidly dissolved and diffused. In a few years nothing is left. It has all gone back into a form which makes it available as oyster food, and it soon begins its transformation into new oyster shells. In this way the oysters obtain some of their lime directly without being compelled to draw on the inland beds of ancient fossils, and if all the shells could be returned to the beds, this source of supply would be greatly increased.

The difference between the right and the left shells of the oyster has a very profound significance, for in science nothing is trivial or unimportant. Most of the near relations of the oyster, like the clam and the fresh-water mussel, have the two sides of the body, and the two shells, alike. These animals are not fastened nor stationary like the oyster. They move from place to place in search of food, and their line of locomotion lies in the plane which divides the body into halves. They are erect and bilaterally symmetrical like other locomotor animals, such as the horse, the fish, the butterfly and the crab. The full-grown oyster has no locomotor power and it lies on its left side, but in the early part of its life it is very active, and is then bilaterally symmetrical like the clam. When it ceases its wanderings and settles down for life, it topples over, falls on its left side, and fastens itself by its left shell, which soon grows deep and spoon-shaped, while the right becomes a flat, movable lid. The body, which was originally symmetrical, becomes distorted or twisted to fit the difference in the shells; and naturalists see in the fact that the locomotor relations of the oyster are symmetrical through life,

while the oyster loses its symmetry as soon as it settles down, one of the proofs that it is descended from locomotor ancestors. There are many other proofs that this has been its history, and that it has, in comparatively modern times, learned to fasten itself to rocks above the soft mud of our bays and estuaries, in order to avail itself of the rich vegetation; that it has lost its symmetry in order to fit it for this mode of life. The oyster is a very ancient animal, and its sedentary habits belong to the modern part of its history; although this change took place very long ago, so far as human chronology goes, and fossil oysters are found in many parts of the world.

In order to understand the anatomy of the oyster, a clear conception of the structure and significance of its gill is most important. In all the bivalve molluscs the gills are very complicated, and they dominate over the whole structure of the body in such a way that an anatomical sketch of the animal is of necessity little more than an account of the gills. A thorough knowledge of the oyster-gill will not only throw light on the purpose and use of all its other organs; it will at the same time help us to understand the great value of the animal as a means for making the microscopic inhabitants of our waters useful, and it will also show how well it is adapted for cultivation, and why it is impossible for natural oysters to stock the whole bay without aid from man.

The labor which is necessary before we can have a clear, accurate picture of them, of their complicated structure, their relations to other parts of the body, their use and their origin, is considerable, but it is well worth while, for the gills give us the key to the whole significance of the oyster; but this requires close attention to all the details of a long, complicated and minute description, which from the nature of the case cannot be stated briefly, although it may all be put in simple language.

A gill is, of course, a breathing organ, for aerating the blood by exposing it to the oxygen in the water; and the oyster has a heart for driving to the various organs of the body the blood which has been purified in the gills. It is easy to see and study the oyster's heart, but in order to do so the animal must be opened with great care, by cutting the muscle with a thin sharp blade, as near the shell as possible. If this is done, a small semi-transparent space will be seen close to the inner edge of the muscle. The thin membrane which covers the space is the pericardium, or the chamber which holds the heart, and through its transparent wall this may be seen slowly pulsating, for an oyster is not killed by opening its shell, and its heart continues to beat for hours, or, under favorable conditions, for days. If the pericardium be gently lifted and cut with sharp scissors, the heart, with its blood-vessels, will be exposed. It consists of two chambers, the auricle, which receives the pure blood

from the gills, and a ventricle, which drives it through arteries to the various organs of the body.

While the gill of an oyster is a breathing organ, like the gill of a fish or crab or conch, this is only one of its many uses. The fish and the crab and the conch have other organs for supplying the gills with a stream of fresh water, but the gills of the oyster, besides purifying the blood, keep up a circulation of water for themselves. They are also organs for gathering up food from the water, and after it has been gathered they become organs for carrying it to the mouth. They are also reproductive organs, adapted for securing the fertilization of the eggs, and thus providing for the propagation of the species. In the European oyster and in the mussel they are also brood-chambers, in which the young are held and protected and nourished during their early stages of growth, until they are large enough to care for themselves.

An organ which is at once a gill, a pump for supplying the gills with water, a food-collector, an organ for carrying the food into the mouth, a reproductive organ, and a nursing-chamber, must, of course, be complicated. The oyster's gill does all these things, and does them all well. It is not a jack-of-all-trades, but a machine which is beautifully adapted for carrying them all on at the same time, in such a way that each use helps the other uses instead of hindering them. This is the more remarkable since an ordinary mollusc, such as the conch, has distinct organs for all these purposes, although the oyster's gill does everything just as well and just as readily as the various organs of the conch.

There are four gills in the oyster, two on each side of the body. They are long, flat, thin, leaf-like organs, placed side by side, and nearly filling the mantle chamber in which they hang. Each gill is made up of two leaves, so that there are in all eight gill-leaves.

If you gum together the ends of a folded sheet of foolscap paper, so as to make a flat pocket, this, when held vertically, with the opening above, will form a pretty good model of a single gill.

The closed portions of the four gills hang down into the mantle-chamber, side by side, but their upper edges are fastened to each other and to the inside of the mantle in such a way that they form a folded partition, something like a double W, which divides the mantle-chamber into two parts: a lower chamber, in which the gills hang, known as the gill-chamber, and an open chamber, into which the pockets open. This chamber is known as the cloaca, the Latin word for a sewer, or channel for waste water, and the fitness of the name will soon be seen.

The partition between the two chambers is formed somewhat in this way. The upper edge of the outer leaf of the outer gill is united, along its whole length, to the inner surface of the mantle. The upper edge of

the inner leaf of the outer gill is united to the same edge of the outer leaf of the inner gill. The upper edges of the inner leaves of the two inner gills are united to each other on the middle line of the body.

If you were to make four pockets out of four sheets of paper, and were then to gum two of them together along their free edges, you would make a double pocket, which might be opened out so that a section through it would be like a W. This would serve as a model of the two gills on one side of the body, and two more sheets, treated in the same way, would make a model of the other two gills. Now gum two W's together, side by side, and the double W will be a model of the four gills. Now open a very large book-cover, just far enough to gum the upper outer edge of one W to the inside of the cover, and the opposite edge of the other W to the other, and you will have a rough model of the coarse anatomy of the oyster's gills. The space between the covers is the mantle-chamber, divided by the gills into a lower portion or gill-chamber, in which the gills hang, and an upper cloacal chamber, into which the pockets open.

So far we have spoken of the gills as if the pockets reached, without interruption, from end to end, but this is not the case. Each pocket is divided up, by a series of vertical partitions, into a number of small cavities—the water tubes, each of which ends blindly below and opens above into the cloaca.

To represent them in our model we must gum the two leaves of each pocket together from top to bottom along a series of vertical lines about an inch apart. Our model is very much larger than the actual gill, of course.

The spaces between the partitions which are thus formed will represent the water tubes, closed below and opening above into the cloaca, and our model will now illustrate the anatomy of the gill, so far as it can be made out without a microscope.

We must now consider the minute anatomy. If a small piece of one of the gills be cut out and spread flat upon a glass slide, so that its surface may be examined under a microscope, it will be found to be thickly covered with parallel ridges running from top to bottom, like the lines on the sheet of paper, each ridge being separated from the next one by a deep furrow. In the bottoms of the furrows there are many minute openings—the water pores, which pass through the wall of the gill into the water tubes, and thus form the channels of communication between the two divisions of the mantle-chamber.

The ridges themselves are hollow, or, rather, each one contains a minute blood-vessel, which runs throughout its entire length, so that each wall of each gill is practically a grating of parallel, vertical blood-vessels, in which the blood is purified by contact with the water which

fills the gills and the chamber in which they hang. The purified blood is then forced into larger vessels, which carry it to the heart, by which it is pumped to all parts of the body, to be again returned to the gills after it has become impure.

The gills are therefore easily intelligible, so far as they are simply organs of respiration; they hang in the water which fills the mantle-chamber, and their walls are filled with blood-vessels in which the blood comes into close contact with the water.

The way in which the current of fresh water is kept up to bathe the gills continually with a new supply is more complicated.

When one of the ridges on the surface of the gill is examined with a high power of the microscope, it is found to be fringed on each side by a row of fine hairs, each one less than $\frac{1}{500}$ inch long, and so fine that they are invisible under a low magnifying power. They project from the sides of the ridges, over the furrows between them, and therefore overhang the water pores in the bottoms of the furrows.

In a fragment cut from a fresh gill, each one of these hairs is constantly swaying back and forth, with a motion like that of an oar in rowing, quick and strong one way, and slower the other way. They all move in time, but they do not keep stroke, for each one comes to rest an instant before the one on the other side; so that waves of motion are continually running from one end of each ridge to the other, like the waves which you have seen running over a field of ripe grain, as each stalk bends before the wind and then recovers.

What would happen if a boat's crew were to row with all their strength, with the boat tied to a wharf? As they could not pull the boat through the water, they would push the water past the boat. This is exactly what these microscopic hairs do. They set up a current in the water. Each one is so small that its individual effect is inconceivably minute, but the innumerable multitude causes a vigorous circulation, and each one is set in such a position that it drives the water before it from the gill-chamber into one of the water pores, and so into one of the water tubes inside the gill; and as these are filled they overflow into the cloaca and fill that. If the mantle were closed, all the water would soon be pumped out of the gill-chamber into the cloaca, but you remember that an oyster at rest always has the mantle open. As fast as the gill-chamber is emptied by the hairs, fresh water streams in from outside to be, in its turn, driven through the water pores into the water tubes, and through them into the cloaca, where it is driven out between the open shells and away from the oyster.

So much for the gills as organs for maintaining a current of water. We come now to the way in which they procure food.

The food of the oyster consists of microscopic organisms, minute animals and plants, which swim in the water. They are pretty abundant in all water, but those who do not work with the microscope have very erroneous ideas on the subject. When a professional exhibitor shows you, under the microscope, what he calls a drop of pure water, it is nothing of the sort. It is either a collection made by filtering several barrels of water, or else it is a drop squeezed from a piece of decayed moss, or from some other substance in which they have lived and multiplied.

Sea water is like fresh water in this respect, and an oyster must strain many gallons of water to get its daily bread; but the gills, with their hundreds of thousands of microscopic water pores, are most efficient strainers.

The surface of the gills is covered by an adhesive excretion for entangling the microscopic organisms contained in the water, and as this circulates over and through the gills, they stick fast like flies on fly-paper. The hairs which drive the water through the gills, push the slime, with the food which has become entangled in it, towards the mouth, which is well up towards the hinge; for it is hardly necessary to say that what the oystermen call the mouth is only the opening between the halves of the mantle.

On each side of the mouth there is a pair of fleshy organs called the lips, although they are more like mustaches than lips, for they hang down on each side of the mouth. One on the right is joined to one on the left, above the mouth, while the other two are joined below it, so that the mouth itself lies in a deep groove or slit between the lips.

The ends of the gills fit into this groove, and as the hairs slide the food forward, it slips at last between the lips and slides into the mouth, which is always open. As this process is going on whenever the oyster is breathing, the supply of food is continuous, and while it consists, for the most part, of invisible organisms, the oyster's stomach is usually well filled. It is not necessary to describe the oyster's stomach and intestine, and dark-colored liver, as these will be understood from the figure. The chief purpose of this anatomical sketch is to show the wonderful way in which the gills of the oyster fit it for gathering up the microscopic life of our bay, and for turning it into valuable human food. Looked at from this point of view, the minute anatomy of the animal becomes eminently practical, as it enables us to understand its true relation to man.

In view of the very exceptional fertility of the bay, and its boundless capacity for producing microscopic vegetation, the immense importance of an animated strainer perfectly adapted for filtering very great quantities of water, for gathering up the microscopic life which it con-

tains, for digesting and assimilating it, and for converting it into food of the most attractive and nutritious character, cannot be overestimated; but after we have studied the embryology of the oyster, we shall understand why the natural oysters alone can never utilize all the resources of our waters. We shall see why it is that the oyster is so well fitted for domestication and cultivation, and why the cultivation of oysters will render the Chesapeake Bay incomparably more valuable than it has ever been, even before our natural beds began to deteriorate.

### THE DEVELOPMENT OF THE OYSTER.

The body of an oyster is not a simple, unorganized lump of flesh, but a complicated organism, made up of many parts, each one so related to the other parts that we must study the whole animal before we can understand the admirable adjustment of each organ to its use.

The oyster is unintelligible until we have studied the organs which compose it, and the organs themselves are unintelligible unless they are studied as constituent parts of the whole.

The oyster is a unit, a complete individual whole, made up of units of a lower order, the organs, in somewhat the same way that a regiment of soldiers is a unit, made up of units of a lower order, the companies.

A description of the organs of the oyster does not, however, by any means complete the analysis of its body, for when any part is studied under a microscope, after it has been properly prepared, it is found to be made up of units of a still lower order, just as each company is made up of individual soldiers, or as the ten dimes which make a dollar are themselves made up of cents.

Every part consists of cells, which are united into organs, in nearly the same way that these are united to form the oyster; and in order that its development from the egg may be intelligible, this fact must be held clearly in mind.

Each cell is a minute portion of living matter, with an individuality of its own, like the individualities of the soldiers which form the regiment.

The properties of each organ are due, in part, to the way in which the cells are arranged, and in part to the properties of the cells themselves, for the cells which enter into one organ may be quite different from those which enter into another.

Each of the cells which form the glandular surface of the mantle is itself a gland, and is quite different from a muscle cell, so that, in a certain sense, the activity of the mantle in forming the shell is the sum of the activities of its cells, just as the evolutions of a regiment are the sum of the actions of the soldiers, but a regiment can do many things

which would be beyond the power of an unorganized mob, and the formation of the shell is due to the activity of the mantle as a whole.

In an adult oyster we have gland cells in the mantle, muscle cells in the muscles, nerve cells in the nervous system, ciliated cells in the gills, and so on; but if we study the animal at earlier and earlier stages, we find that these distinctions disappear, until, in ultimate analysis, all the cells are alike so far as the microscope can tell us.

They are simply minute, definitely limited masses of living matter, with the power to grow when furnished with food; and after their size has thus increased, they have the power to multiply by splitting up into smaller and more numerous cells, which in their turn grow and multiply in the same way.

They at first exhibit no traces whatever of the uses to which they are to be put, but as they grow older they gradually become specialized in various directions and are built up into the tissues and organs of the body, losing at the same time their sharp distinctness and fusing with each other.

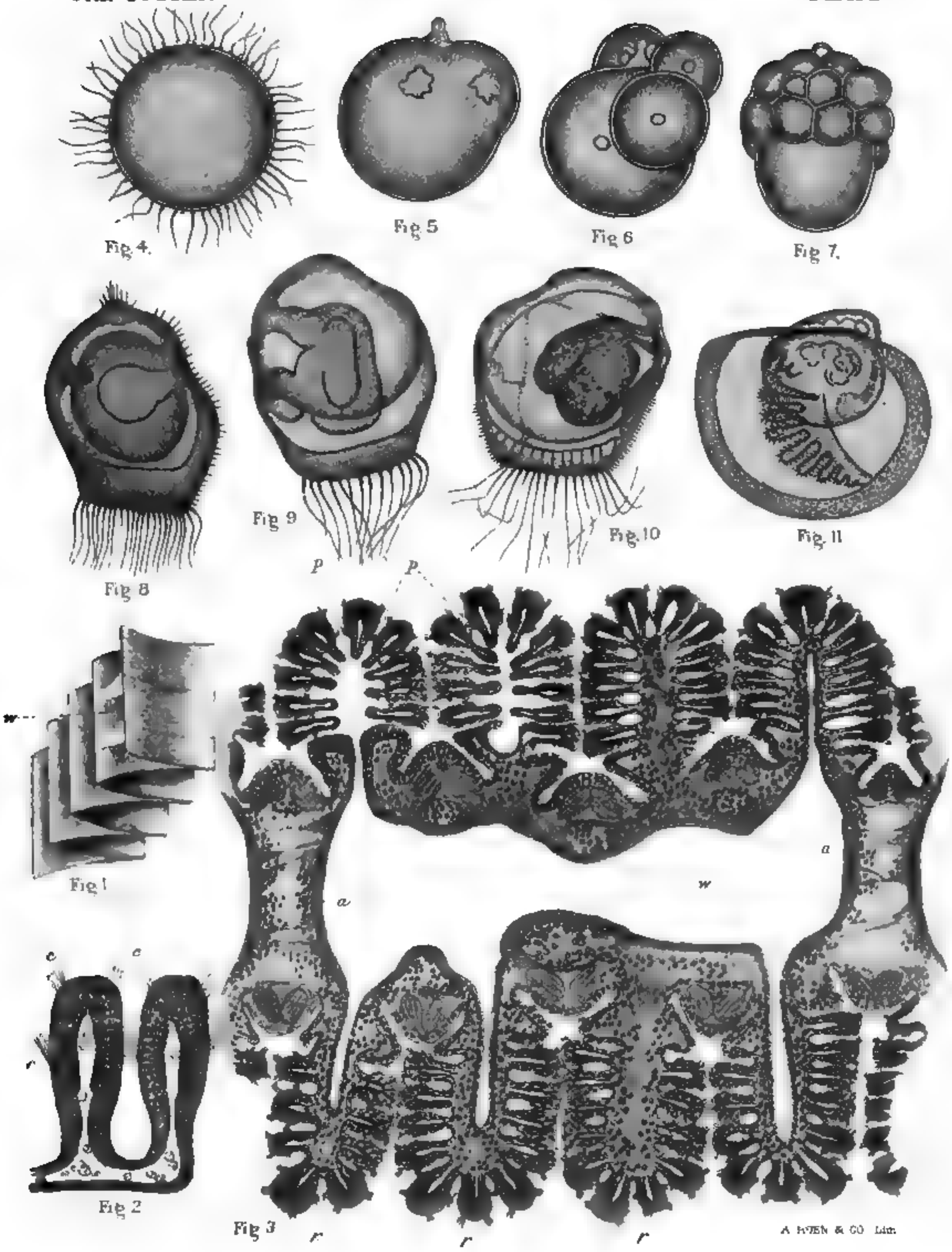
Just as certain cells become gland cells, others muscle cells, and so on, certain cells of the adult body become set apart as reproductive cells, eggs in the female and male cells in the male.

The egg cells grow until they become very much larger than any of the ordinary cells of the body; at the same time their outlines become sharply defined, and they become dark-colored and granular. The granular appearance is due to the fact that as they approach maturity they become filled with food, which is stored away in them as a provision for the time when they are to be cast off from the body of the oyster, to lead an independent existence.

The male cells are very much smaller than the eggs, they contain little food, and when they are mature each of them is furnished with a long cilium or vibrating hair, by means of which the cell is able to swim in the water, while the egg is motionless and sinks to the bottom as soon as it is set free.

When the reproductive elements are fully ripe they are discharged from the body into the cloacal chamber of the mantle. The male cells are swept out into the ocean by the current produced by the gill cilia. As they contain no food supply, their power to live independently is very limited, and all soon die except those which come into contact with eggs.

In the American oyster the eggs are swept out into the water in the same way. The eggs of the European oyster are much larger and heavier, and they fall into the water tubes of the gills and lodge there. Here they are exposed to the current of water which circulates through the gills, and this current brings with it some of the male cells which swim in the water around the oyster-bed. As soon as one of them comes




THE ANATOMY AND DEVELOPMENT OF THE OYSTER.

into contact with an egg it fuses with it and loses its individuality and is lost in the substance of the egg, which is thus fertilized and at once begins its development into a new oyster.

There is no such provision for securing the fertilization of the eggs of the American oyster. They are thrown out into the water, like the male cells, to be fertilized by accident, and while many of them meet with male cells, innumerable multitudes sink to the bottom and are lost. It is fortunate for other animals that this is the case, for our oyster is so prolific that if all the eggs were to be fertilized and were to live and to grow to maturity, they would fill up the entire bay in a single season.

Far from being an exaggeration, this statement is much short of the truth. An average Maryland oyster of good size lays about sixteen million eggs, and if half of these were to develop into female oysters, we should have, from a single female, eight million female descendants in the first generation, and in the second, eight million times eight million or 64,000,000,000,000. In the third generation we should have eight million times this or 512,000,000,000,000,000,000. In the fourth, 4,096,000,000,000,000,000,000,000,000. In the fifth, 33,000,000,000,000,000,000,000,000,000,000,000 female oysters, and as many males, or, in all, 66,000,000,000,000,000,000,000,000,000,000,000.

Now, if each oyster fill eight cubic inches of space, it would take 8,000,000,000,000,000,000,000,000,000,000,000 to make a mass as large as the earth, and the fifth generation of descendants from a single female oyster would make more than eight worlds, even if each female laid only one brood of eggs. As the oyster lives for many years, and lays eggs each year, the possible rate of increase is very much greater than that shown by the figures.

The waste of oyster eggs through lack of fertilization is simply inconceivable; but it is possible to fertilize them artificially by mixing the eggs and the male cells in a small quantity of water, where they are certain to come into contact with each other. In this way about 98 per cent. of the eggs may be saved and made to produce young oysters, and the writer has had at one time in a small tumbler of water a number of active and healthy oysters, greater, many times, than the whole human population of Maryland

If several oysters are opened during the breeding season, which varies according to locality and climate, as will hereafter be shown, a few will be found with the reproductive organ greatly distended and of a uniform opaque-white color. These are oysters which are spawning or ready to spawn, that is, to discharge their eggs. Sometimes the ovaries are so gorged that the ripe eggs ooze from the openings of the

oviducts before the mass is quite at the point of being discharged. If the point of a knife be pushed into the swollen ovary, a milk-white fluid will flow out of the cut. Mixing a little of this with sea water, and placing it on a slide underneath a cover, a lens of 100 diameters will show, if the specimen is a female, that the white fluid is almost entirely made up of irregular, pear-shaped, ovarian eggs, each of which contains a large, circular, transparent, germinative vesicle, surrounded by a layer of a granular, slightly opaque yolk. Perfectly ripe eggs will be seen to be clean, sharply defined, and separate from each other. If the specimen be male, a glance through the microscope shows something quite different from the fluid of a female. There are no large bodies like the eggs, but the fluid is filled with innumerable numbers of minute granules, which are so small that they are barely visible when magnified 100 diameters. They are not uniformly distributed, but are much more numerous at some points than at others, and for this reason the fluid has a cloudy or curdled appearance. By selecting a place where the granules are few and pretty well scattered, very careful watching will show that each of them has a lively, dancing motion; and examination with a power of 500 diameters will show that each of them is tadpole-shaped, and consists of a small, oval, sharply-defined "head," and a long, delicate "tail," by the lashing of which the dancing is produced. These are the male cells, whose union with the eggs of the female is necessary to the fertilization of the latter and the consequent hatching of living oysters.

The number of male cells which a single male will yield is great beyond all power of expression, but the number of eggs which an average female will furnish may be estimated with sufficient exactness. An unusually large American oyster will yield nearly a cubic inch of eggs, and if these were all in absolute contact with each other, and there were no portions of the ovaries or other organs mixed with them, the cubic inch would contain $500^3$, or 125,000,000. Dividing this by two, to allow for foreign matter, inter-spaces and errors of measurement, we have about 60,000,000 as the possible number of eggs from a single very large oyster.

It has been shown that by mixing eggs extracted from a female with male cells it is an easy matter to secure their union in a watch-crystal or in a glass beaker.

The body of the oyster, like that of all animals, except the very simplest, is made up of organs; such as the heart, digestive organs, gills and reproductive organs, and these organs are at some period in the life of the oyster made up of microscopic cells. Each of these consists of a layer of protoplasm around a central nucleus, which, in the egg, is a large, circular, transparent body, known as the germinative vesicle.

Each cell of the body is able to absorb food, to grow, and to multiply by division, and thus to contribute to the growth of the organ of which it forms a part. The ovarian eggs are simply the cells of an organ of the body, the ovary, and, so far as the microscope shows, they differ from the ordinary cells only in being much larger and more distinct from each other; and they have the power, when detached from the body, of growing and dividing up into cells, which shall shape themselves into a new organism like that from whose body the eggs came. Most of the steps in this wonderful process may be watched under the microscope, and, owing to the ease with which the eggs of the oyster may be obtained, this is a very good egg to study.

About fifteen minutes after the eggs are fertilized they will be found to be covered with male cells. In about an hour the egg will be found to have changed its shape and appearance. It is now nearly spherical, and the germinative vesicle is no longer visible. The male cells may or may not still be visible upon the outer surface. In a short time a little transparent point makes its appearance on the surface of the egg, increases in size, and soon forms a little, projecting, transparent knob—the pole-cell.

Recent investigations tend to show that while these changes are taking place, one of the male cells penetrates the protoplasm of the egg and unites with the germinative vesicle, which does not disappear, but divides into two parts, one of which is pushed out of the egg and becomes the pole-cell, while the other remains behind and becomes the nucleus of the developing egg, but changes its appearance so that it is no longer conspicuous. The egg now becomes pear-shaped, with the pole-cell at the broad end of the pear, and this end soon divides into two parts, so that the egg is now made of one large mass and two slightly smaller ones, with the pole-cell between them.

The later history of the egg shows that at this early stage it is not perfectly homogeneous, but that the protoplasm which is to give rise to certain organs of the body has separated from that which is to give rise to others.

If the egg were split vertically we should have what is to become one-half of the body in one part and the other half in the other. The single spherule at the small end of the pear is to give rise to the cells of the digestive tract of the adult, and to those organs which are derived from it, while the two spheres at the large end are to form the cells of the outer wall of the body and the organs which are derived from it, such as the gills, the lips and the mantle, and they are also to give rise to the shell. The upper portion of the egg soon divides up into smaller and smaller spherules, until we have a layer of small cells wrapped around the greater part of the surface of a single large spherule. This

spherule now divides into a layer of cells, and at the same time the egg, or rather the embryo, becomes flattened from above downward and assumes the shape of a flat, oval disk. In a sectional view it is seen to be made up of two layers of cells; an upper layer of small transparent cells, which are to form the outer wall of the body, and which have been formed by the division of the spherules which occupy the upper end of the egg; and a lower layer of much larger, more opaque cells, which are to become the walls of the stomach, and which have been formed by the division of the large spherule.

This layer is seen, in a section, to be pushed in a little toward the upper layer, so that the lower surface of the disk-shaped embryo is not flat, but very slightly concave. This concavity is destined to grow deeper until its edges almost meet, and it is the rudimentary digestive cavity. A very short time after this stage has been reached, and usually within from two to four hours after the eggs were fertilized, the embryo undergoes a great change of shape.

A circular tuft of long hairs, or cilia, now makes its appearance at what is thus marked as the interior end of the body, and as soon as these hairs are formed they begin to swing backward and forward in such a way as to constitute a swimming organ, which rows the little animal up from the bottom to the surface of the water, where it swims around very actively by the aid of its cilia. This stage of development, which is of short duration, is of great importance in rearing the young oysters, for it is the time when they can best be siphoned off into a separate vessel and freed from the danger of being killed by the decay of any eggs which may fail to develop. On one surface of the body at this stage there is a well-marked groove, and when a specimen is found in a proper position for examination, the opening into the digestive tract is found at the bottom of this groove. The embryo now consists of a central cavity, the digestive cavity, which opens externally by a small orifice, the primitive mouth, and which is surrounded at all points, except at the mouth, by a wall which is distinct from the outer wall of the body. Around the primitive mouth these two layers are continuous with each other.

Soon a small irregular plate makes its appearance on each side of the body. These little plates are the two valves of the shell, and in the oyster they are separated from each other from the first, and make their appearance independently.

Soon after they make their appearance the embryos cease to crowd to the surface of the water, and sink to various depths, although they continue to swim actively in all directions, and may still be found, occasionally, close to the surface. The region of the body which carries the cilia now becomes sharply defined, as a circular, projecting pad, the

*velum*, and this is present and is the organ of locomotion, at a much later stage of development.

The two shells grow rapidly and soon become quite regular in outline, but for some time they are much smaller than the body, which projects from between their edges, around their whole circumference, except along a short area, the area of the hinge, upon the dorsal surface, where the two valves are in contact.

The two shells continue to grow at their edges, and soon become large enough to cover up and project a little beyond the surface of the body, and at the same time muscular fibres make their appearance. They are so arranged that they can draw the edge of the body and the velum in between the edges of the shell. In this way that surface of the body which lines the shell becomes converted into the two lobes of the mantle, and between them a mantle cavity is formed, into which the velum can be drawn when the animal is at rest. While these changes have been going on over the outer surface of the body, other important internal modifications have taken place.

Soon the outer wall of the body becomes pushed inward, to form the mouth. The digestive cavity now becomes greatly enlarged, and cilia make their appearance upon its walls; the mouth becomes connected with the chamber which is thus formed, and which becomes the stomach, and minute particles of food are drawn in by the cilia, and can now be seen inside the stomach, where the vibration of the cilia keep them in constant motion. Up to this time the animal has developed without growing, and is scarcely larger than the unfertilized egg, but it now begins to increase in size.

Soon after the mouth has become connected with the stomach this becomes united to the body wall at another point a little behind the mouth, and a second opening, the *anus*, is formed. The tract which connects the anus with the stomach lengthens and forms the intestine, and soon after, the sides of the stomach become folded off to form the two halves of the liver, and various muscular fibres now make their appearance within the body.

Such is the scientific history of the oyster-embryo. The practical utility of the knowledge, however, to the most of us, is that the American oyster lays a vast number of eggs, but that they are exposed to dangers so constant and innumerable, that under ordinary conditions few ever come to life, or at any rate succeed in living long enough to anchor themselves and take on the protection of shells. This is only another example of a fact well known to naturalists. The number of eggs laid, or even of individuals born, has very little to do with the abundance of a species, which is determined mainly by the external conditions to which it is exposed.

The young American oyster leads a peculiarly precarious life, since it is first thrown out an unfertilized egg, and the chance that it will immediately meet with a male cell must be very slight; yet if it does not it will perish, for the sea-water soon destroys unimpregnated eggs. Having by good chance become fertilized by meeting a male cell, the next period of great danger is the short time during which the embryos swarm to the surface of the water. They are so perfectly defenseless, and so crowded together close to the surface, that a small fish, swimming along with open mouth, might easily swallow, in a few mouthfuls, a number equal to a year's catch. They are also exposed to the weather, and a sudden cold wind or fall in temperature, such as occurred several times during our experiments, killed every embryo. The number which are destroyed by cold rains and winds must be very great indeed. As soon as they are safely past this stage, and scatter and swim at various depths, their risks from accidents and enemies are greatly diminished. Up to this point, which is reached in from twenty-four hours to six days, there is no difficulty in rearing them in an aquarium, provided uniform warm temperature be preserved.

Although we failed to keep the young oysters alive until they were large enough to handle and plant, our experiments showed the possibility of rearing them in unlimited numbers, so soon as some practical method of preserving them alive during their infancy should be discovered.

The mature oyster is a sedentary animal with no power of locomotion. It lies on its side, soldered to the bottom by the outside of the deep spoon-shaped left shell, for which the flat right shell forms a movable lid. Its gills are very complicated organs, adapted for drawing into the fixed shell a steady current of water, and they pour into the open mouth of the animal a constant stream of food, so that eating goes on as uninterruptedly as breathing, and is just as much beyond the control of the animal. The adult oyster makes no efforts to obtain its food, it has no way to escape from danger, and after its shell is entered it is perfectly helpless and at the mercy of the smallest enemy. So far as active aggressive life goes it is almost as inert and inanimate as a plant, and its life is purely vegetative. This is the adult oyster. The young oyster is very different. It is an active animal, swimming from place to place. Its gills are not leaf-like, and they do not divide the mantle-chamber into two parts. They are nothing but breathing organs, and are simple, finger-like tentacles which hang down into the water. There is no gill-current as there is in the adult, and the young oyster must find its own food by swimming through the water. Its two shells are also exactly alike, and therefore quite different from those of the adult.

The egg therefore tends, at first, to build up an animal which differs greatly from the adult, in structure as well as in habits, and naturalists

believe that our modern oysters are the descendants of an ancient form which was not sedentary, and the egg at first exhibits a decided tendency to build up this ancestor rather than an oyster.

Some may ask how we know that the remote ancestors of the oyster were different from modern oysters. This is a fair question, and we shall try to give an outline of the reasons for this opinion, and perhaps an illustration may help us.

When a Baltimorean visits New York or Savannah or Boston or Chicago, he finds that while the people of these cities talk the same language, it is with a difference. They all talk what they call English, but when an Englishman comes among us he tells us that it is not English; and it is quite clear to an American who visits England that the people there do not know how to talk United States, although the differences are trivial ones, of accent and idiom, and do not in the least hinder conversation.

If, however, we cross the narrow strip of water which separates England from the German empire, we find a strange language, which at first seems totally unfamiliar and unintelligible, but as our ears become more accustomed to the strange sounds we find many which are not as unintelligible as they seemed at first.

When a German talks of his *vater*, his *mutter*, his *bruder*, his *schwester*, when he asks us to share his *brod und butter*, or offers us a *glas wasser* or a *glas bier*, we need no dictionary to tell us what he means.

We know that the Americans and the English of to-day are descended from common ancestors, only a few generations back, from whom we have inherited their common language; and we know from literature that this was not exactly the same as modern English or modern American, and history also tells us that still further back, Anglo-Saxon and modern German had a common starting point. Philologists therefore make use of the resemblances between languages to trace out their origin; and whenever they find that two or three languages have a common plan, a fundamental similarity of grammatical structure, they believe that they are divergent modifications from a common starting-point. In some cases printed language has preserved an actual history of the process, but in other cases, where there is no such history, the student of comparative grammar forms his conclusions by comparison; and, even where the primitive language is lost, he is able to reconstruct it in part, for he knows that it must have been characterized by all the features which its derivatives have in common.

Now, animals exhibit resemblances of very much the same character as those between languages; and when we find that several representatives of a great group are constructed upon the same fundamental plan, we infer, just as the philologist does, that they are the divergent descendants

of a common ancestor, from whom they have inherited the features which they have in common.

The philologist is sometimes able to verify his conclusion by the proofs which have been preserved in books and inscriptions, and he regards this as evidence that, in other cases where no such record is preserved, his results are equally trustworthy.

Occasionally the student of comparative anatomy, like the student of comparative grammar, finds a fossil form which unites in itself the characteristics of several widely separated descendants, and he is thus enabled to test and to verify the conclusions which he has reached by comparative study.

In this way, through the study of details too numerous and minute to be described here, it can be shown that the oyster is descended from a mollusc which was furnished with locomotor organs and sense organs, and which wandered about in search of food, and had altogether a much wider and more varied life than that of the oyster. Its gills were very simple and were nothing but breathing organs, and the many uses which they serve were provided for by distinct organs.

Very long ago, as we measure time, but quite late in the history of the mollusca, as the continental areas were elevated and became covered with terrestrial vegetation, and fringed by bays and sounds of brackish water, the oyster gradually became modified in such a way as to fit it for life in these estuaries. Its locomotor organs and its organs for discovering and capturing food were gradually lost, as it learned to feed upon the microscopic life of the mud-flats. The gills then gradually became modified and fitted for maintaining the circulation of water, and for filtering out the minute food particles it contains.

Food is most abundant on the muddy bottom; but in estuaries this is so deep and soft that a locomotor animal would sink and smother in it, so the oyster has gradually become converted into a fixture, and has learned to fasten itself when young to something firm enough to keep it out of the soft mud, but near enough to it to be within easy reach of the vast supply of food which it affords. As a fixed animal does not need to have the two sides of its body balanced, the fixed oyster has become one-sided, and has thus been still better fitted for its peculiar mode of life.

These changes, while they are on the whole advantageous, since they enable the oysters to avail themselves of inexhaustible supplies of food, are not without disadvantage. The oyster has become so perfectly adapted for a life on those hard bodies which occur in the soft mud of estuaries, that it cannot live anywhere else, and the young oysters which do not find a proper home soon die. In shallow bays and sounds hard substances are rare and far apart, and many young oysters must perish

from inability to find a proper resting place. To meet this danger the oyster's birth-rate has been enormously increased, so that among its innumerable descendants some few may be able to find proper homes, and may grow up to maturity in their turn.

### THE ARTIFICIAL CULTIVATION OF OYSTERS.

If the Chesapeake Bay is as rich in food for oysters as we have asserted, and if the oyster multiplies at such a very high rate of increase, how can our oyster supply be in any danger, or how can there be any need for aid from man in order to maintain and develop the oyster-beds? At first sight it does not seem possible that an animal which is protected from enemies by a strong stony shell, and which is capable of giving rise to several million eggs each season, can be in any danger of extermination; and it seems as if the oyster ought to be able to hold its own in the struggle for existence, and to increase and multiply in spite of adverse circumstances.

We should rather expect to find the whole bottom of the bay paved with oysters; and for many years, the statement that there is any need for measures to prevent the destruction of our natural beds and the total extermination of our oysters has been met with ridicule, and it has been flatly contradicted by persons whose qualifications for expressing an opinion would seem to be very great.

The history of the oyster-beds of Europe, and of those in many of the Northern States, should have been enough to warn us, years ago, of the need for the protection and development of our own beds, but our people have been too confident of the inexhaustible vitality of our own beds to heed the warning. So long as the consumption of oysters was restricted to regions in the immediate vicinity of the bay, the number of oysters which could be taken from each bed and put upon the market each season was so small that it could be furnished without taxing the beds; but more than ten years ago, November, 1879, the writer called attention to the fact that the perfection of our facilities for packing and transporting oysters had produced such a great demand, that the danger of destroying our best beds was growing greater every day, and was keeping pace with the growth of our population and the improvements in transportation. For the instruction of those who believe that the supply is sufficient for all demands, facts were cited from the history of other countries.

No one who is familiar with the history of the oyster-beds of other parts of the world can be surprised at the deterioration of our own beds. Everywhere, in France, in Germany, in England, and in all northern coast states, history tells the same story. In all waters where oysters are found at all they are usually found in abundance, and in all these places

the residents supposed that their natural beds were inexhaustible until they suddenly found that they were exhausted. The immense area covered by our own beds has enabled them to withstand the attacks of the oystermen for a much longer time, but all who are familiar with the subject have long been aware that our present system can have only one result—extermination.

In view of these facts, no one who appreciates the magnitude of the oyster industry of the Chesapeake Bay can doubt that the protection of our beds is a matter of vital importance, for it is quite clear that we cannot trust to the natural fecundity of the oyster.

It is well known to naturalists that the number of individuals which reach maturity in any species of animal or plant does not depend on the number which are born. The common tapeworm lays hundreds of millions of eggs in a very short time, yet it is comparatively rare. The number of children born to each pair of human beings during their lifetime of sixty of seventy years can be counted on the fingers, yet man is the most abundant of the large mammals. The abundance of a species is mainly determined by the external conditions of life, and the number of individuals which are born has very little to do with it.

In the case of the oyster, the adult is well protected against the attacks of most of the enemies which are found in our waters, by its shell; and as its food is very abundant and is brought to it in an unfailing supply by the water, it is pretty sure of a long life after it has reached its adult form; but the life of the young oyster is very precarious: that of the young American oyster peculiarly so, since it is exposed to many enemies and accidents at the time when it is most helpless. The oyster of Northern Europe lays from one to two million eggs, while our oyster lays about ten times as many; but the protection which is afforded to the young European oyster by the shell of the parent more than balances the greater birth-rate of our oyster.

The most critical time in the life of the American oyster is undoubtedly the time when the egg is discharged into the water to be fertilized, for the chance that each egg which floats out into the bay to shift for itself will immediately meet with a male cell is very slight, and infinite numbers of eggs are lost from this cause. The next period of great danger comes as the little embryos begin to swim and crowd to the surface of the water. They are so totally defenceless and are so close together that a little fish swimming along with open mouth may swallow thousands in a few mouthfuls, and we have found that at this time a sudden fall of temperature is fatal to them, and a cold rain may destroy millions. As soon as they are safely past this stage and have scattered and begin to swim at various depths, their danger from accidents and enemies is greatly diminished, and their chance of reaching maturity

increases rapidly. Experiments which we carried on many years ago show that there is no difficulty in rearing them up to this point in captivity, and that in a very small aquarium millions of them may be safely carried past the most precarious part of their lives and freed from their greatest dangers.

Although the mortality at their early stages is so excessive, the number of young oysters which pass through them in safety without artificial help is very great, and if there were no other dangers or uncertainties there would be no need of measures for their protection. As they swim to and fro in the water they are carried to great distances by the tides and currents, and they reach all parts of the region of water within several miles of the parent bed. In a favorable season, any plant, or bush, or piece of driftwood which floats near an oyster-bed becomes covered with small oysters, although the nearest bed may be miles away; and the fact that young oysters may be thus collected in any part of our bay shows that they are distributed everywhere, and we might expect the adults to have an equally general distribution. This is by no means the case, and nothing can be farther from the truth than the idea that the bottom of the oyster area is uniformly covered with oysters or ever has been, although it is quite true that oysters may be reared artificially over nearly the whole of it. The idea that it is only necessary to throw a dredge overboard anywhere in the oyster area, and to drag it along the bottom for a short distance in order to bring it up full, is totally erroneous. Such a condition of things is quite within the reach of the cultivator, but it never exists under natural influences alone. In this country, as well as in Europe, the oysters are restricted to particular spots called "banks," or "beds," or "rocks," which are as well defined and almost as sharply limited as the tracts of woodland in a farming country —they are so well marked that they may be laid down on a chart, or they may be staked out with buoys; and even in the best dredging grounds they occupy such an inconsiderable part of the bottom that no one would have much chance of finding oysters by promiscuous dredging, in ignorance of their location. Although the young are distributed every year by the tides and currents over all parts of the bottom, the dredge seldom brings up even a single oyster outside the limits of the beds, under natural conditions.

The restriction of the oysters to certain points does not depend on the supply of food, for this is everywhere abundant, nor to any great degree upon the character of the water. It is almost entirely due to the nature of the bottom.

The full-grown oyster is able to live and flourish in soft mud so long as it is not buried too deeply for the open edge of the shell to reach above the mud and draw a constant supply of water to its gills; but the oyster

embryo would be ingulfed and smothered at once if it were to fall on such a bottom, and in order to have the least chance of survival it must find some solid substance upon which to fasten itself, to preserve it from sinking in the soft mud, or from being buried under it as it shifts with wind and tide. In the deposits which form the soft bottom of sounds and estuaries solid bodies of any sort rarely occur; and the so-called "rocks" of the Chesapeake are not ledges or reefs, but accumulations of oyster shells.

Examination of a Coast Survey chart of any part of the Chesapeake Bay or of any of its tributaries will show that there is usually a mid-channel, or line of deep water, where the bottom is generally soft and where no oysters are met with, and on each side of this an area where the bottom is hard, running from the edge of the channel to the shore. This hard strip is the oyster area. It varies in width from a few yards to several miles, and the depth of the water varies upon it from a few feet to five or six fathoms, or even more. But there is usually a sudden fall at the edge of the channel, where the oysters stop, and we pass to soft bottom. The oyster bottom is pretty continuous, except opposite the mouth of a tributary, where it is cut across by a deep, muddy channel. The solid oyster rocks are usually situated along the outer edge of this plateau, although in many cases they are found over its whole width nearly up to low-tide mark, or beyond. As we pass south along the bays and sounds of Virginia and North Carolina, we find that the hard borders of the channel come nearer and nearer to the surface, until in the lower part of North Carolina there is on each side of the channel a wide strip of hard bottom, which is bare at low tide and covered with oysters up to high-water mark, although the oysters are most abundant and largest at edge of the deep water, where they form a well-defined reef. In our own waters there is usually a strip along the shore where no oysters are found, as the depth of water is not great enough to protect them in winter. The whole of the hard belt is not uniformly covered with oysters, but it is divided up into separate oyster rocks, between which comparatively few can be found.

The boundaries of a natural rock which has not been changed by dredging are usually well defined, and few oysters are to be found beyond its limits. The oysters are crowded together so closely that they cannot lie flat, but grow vertically upwards, side by side. They are long and narrow, are fastened together in clusters, and are known as "coon" oysters.

When such a bed is carefully examined it will be found that most of the rock is made up of empty shells; and a little examination will show that the crowding is so great that the growth of one oyster prevents adjacent ones from opening their shells, and thus crowds them out and exterminates them. Examination shows, too, that nearly every one of

Fig. 1

Fig. 2

A. Hoen & Co. Lithocaustic, Baltimore.

YOUNG OYSTERS ATTACHED TO A SHOE AND A BOULDER.

the living oysters is fastened to the open or free end of a dead shell which has thus been crowded to death; and it is not at all unusual to find a pile of five or six shells thus united, showing that number two had fastened, when small, to the open end of number one, thus raising itself a little above the crowd. After number one was killed number two continued to grow, and number three fastened itself to its shell, and so on. Usually the oysters upon such a bed are small, but in some places shells twelve or fourteen inches long are met with. The most significant characteristic of a bed of this kind is the sharpness of its boundaries. In regions where the oysters are never disturbed by man it is not unusual to find a hard bottom, which extends along the edge of the shore for miles, and is divided up into a number of oyster rocks, where the oysters are so thick that most of them are crowded out and die long before they are full-grown, and between these beds are areas where not a single oyster can be found. The intervening area is perfectly adapted for the oyster, and when a few bushels of shells are scattered upon it they are soon covered with young, and in a year or two a new oyster rock is established upon them, but when they are left to themselves the rocks remain sharply defined. What is the reason for this sharp limitation of a natural bed? Those who know the oyster only in its adult condition may believe that it is due to the absence of power of locomotion, and may hold that the young oysters grew up among the old ones, just as young oak trees grow up where the acorns fall from the branches. This cannot be the true explanation, for the young oysters are swimming animals, and they are discharged into the water in countless numbers, to be swept away to great distances by the currents. As they are too small to be seen at this time without a microscope, it is impossible to trace their wanderings directly, but is possible to show indirectly that they are carried to great distances, and that the water for miles around the natural bed is full of them. They serve as food for other marine animals, and when the contents of the stomachs of these animals are carefully examined with a microscope, the shells of the little oysters are often found in abundance. While examining the contents of the stomach of lingula in this way we have found hundreds of the shells of the young oysters in the swimming stage of growth, although the specimens of lingula were captured several miles from the nearest oyster-bed. As lingula is a fixed animal the oysters must have been brought to the spot where the specimens were found; and as lingula has no means of capturing its food, and subsists upon what is swept within its reach by the water, the presence of so many inside its stomach shows that the water must have contained great numbers of them.

It is clear, then, that the sharp limitation of the area of a natural oyster-bed is not due to the absence in the young of the power to reach

distant points. There is another proof of this, which is familiar to all oystermen—the possibility of establishing new beds without transplanting any oysters.

We once observed an illustration of this. On part of a large mud-flat which was bare at low tide there were no oysters, although there was a natural bed upon the same flats, about half a mile away.

A wharf was built from high-tide mark across the flat out to the edge of the channel, and the shells of all the oysters used in the house were thrown on to the mud alongside the wharf. In the third summer the flat in the vicinity of the wharf had become converted into an oyster-bed, with a few medium-sized oysters and very great numbers of young, and the bottom, which had been rather soft, had become quite hard; in fact, the spot presented all the characteristics of a natural bed. Changes of this sort are a matter of familiar experience, and it is plain that something else besides the absence in the oyster of locomotor power determines the size and position of a bed.

Now what is this *something else?*

If the planting of dead shells will build up a new bed, may we not conclude that a natural bed tends to retain its position and size because the shells are there?

This conclusion may not seem to be very important, but we hope to show that it is really of fundamental importance, and is essential to a correct conception of the oyster problem.

Why should the presence of shells, which are dead and have no power to multiply, have anything to do with the perpetuation of a bed?

We have already called attention to the fact that oysters are found on the hard bottom on each side of the channel, while they are not found in the soft mud of the channel itself, and it may at first seem as if there were some direct connection between a hard bottom and the presence of oysters, but the fact that no oysters are found upon the hard, firm sand of the ocean beach shows that this is not the case. As a matter of fact, they thrive best upon a soft bottom. They feed upon the floating organic matter which is brought to them by the water, and this food is most abundant where the water flows in a strong current over soft organic mud. When the bottom is hard there is little food, and this little is not favorably placed for diffusion by the water, while the water which flows over soft mud is rich in food.

The young oysters which settle upon or near a soft bottom are therefore most favorably placed for procuring food, but the young oyster is very small—so small that a layer of mud as deep as the thickness of a sheet of paper would smother and destroy it. Hence the young oysters have the habit of fastening themselves to solid bodies, such as shells,

Fig 1

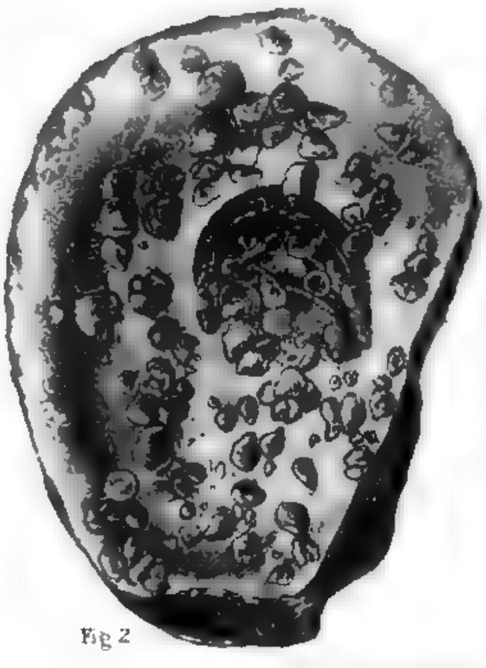


Fig 2

Fig 3

A.Hoen & Co. Lithocaustic Baltimore

YOUNG OYSTERS FASTENED TO SOLID BODIES.

rocks or piles, or floating bushes, and they are thus enabled to profit by the soft bottoms without danger.

Owing to the peculiar shape of an oyster shell, some portions usually project above the mud long after most of it is buried, and its rough surface furnishes an excellent basis for attachment. It forms one of the very best supports for the young, and a little swimming oyster is especially fortunate if it finds a clean shell to adhere to when it is ready to settle down for life. Then, too, the decaying and crumbling shells are gradually dissolved in the sea water, and thus furnish the lime which the growing oyster needs to build up its own shell. As long as the shell is soft and thin, the danger from enemies is very great, and this danger is greatly diminished as soon as the shell becomes thick enough to resist attack. It is, therefore, very necessary that the shell should be built up as rapidly as possible; and an abundant supply of food in general will be of no advantage unless the supply of lime is great enough for the growth of the shell to keep pace with the growth of the body. All sea water contains lime in solution, but the percentage is, of course, greatest near the sources of supply. It is well known that on coral reefs, which are entirely made of lime, all kinds of shelled molluscs flourish in unusual abundance, and have very strong and massive shells; and our common land and fresh-water snails are much larger and more abundant in a limestone region than in one where the supply of lime is scanty. In such regions it is not unusual to find the snails gathered around old decaying bones, to which they have resorted to obtain a supply of lime for their shells.

From all these causes combined it results that a young oyster which settles upon a natural oyster-bed has a much better chance of survival than one which settles anywhere else; and a natural bed thus tends to perpetuate itself and to persist as a definite, well-defined area; but there is still another reason. As the flood-tide rushes up the channels it stirs up the fine mud which has been deposited in the deep water. The mud is swept up on to the shallows along the shore, and if these are level, much of the sediment settles there. If, however, the flat is covered by groups of oysters, the ebbing tide does not flow off in an even sheet, but is broken up into thousands of small channels, through which the sediment flows down, to be swept out to sea.

The oyster-bed thus tends to keep itself clean; and for these various reasons it follows that the more firmly established an oyster-bed is, the better is its chance of perpetuation, since the young spat finds more favorable conditions where there are oysters, or at least shells, already, than it finds anywhere else.

Now, what is the practical importance of this description of a natural bed?

It is this: Since a natural bed tends to remain permanent, because of the presence of oyster shells, the shelling of bottoms where there are no oysters furnishes us with a means for establishing new beds or for increasing the area of the old ones.

The oyster dredgers state, with perfect truth, that by breaking up the crowded clusters of oysters and by scattering the shells, the use of the dredge tends to enlarge the oyster-beds. The sketch which we have just given shows the truth of this assertion; but this is a very rough and crude way of accomplishing this end, and we shall now give a description of the means which have been employed in different places to accomplish the same result more efficiently and methodically.

Within recent years, much attention has been given to the possibility of increasing the supply of oysters by artificial means.

The oyster is well known to be enormously prolific, a single one giving birth in one season to many million young, and it is obvious that the annual supply would be enormously increased if all the young which are born could be reared to maturity.

Unfortunately, this is not the case, and under a state of nature millions of oysters are born for each one which grows to maturity. Mobius has shown that in Europe each oyster which is born has only one chance in one million one hundred and forty-five thousand of reaching maturity; we have shown that the chances of each American oyster are very much less.

One of the most important discoveries of the last fifty years is, that it is quite possible to save many of these oysters by artificial means; and experiments which have been carried on in France, as well as in many parts of our own country, prove that this can be done, successfully and economically, on a very large scale.

Soon after it is born the young oyster fastens itself to some solid body. It is at first so small that it is smothered and killed at once if it falls upon a muddy or slimy bottom, and its only chance for life is in the discovery of some perfectly clean, hard body upon which to fasten. Many young oysters are killed by accidents or enemies after they have fastened themselves, but by far the greater number perish through failure to find proper places for attachment; and the whole secret of oyster culture is to furnish proper bodies for the attachment of the young.

Many methods of doing this have been devised and employed, and the possibility of in this way increasing the area and value of the natural beds, and of building up new beds or restoring old ones, has been proved.

At present no spat-collector seems to be better adapted for use in our waters upon hard bottoms than oyster shells, and they are now the cheapest collectors that can be used.

In order to serve this purpose the shells must be perfectly clean; and as the old dead shells, which have lain for a long time upon the oyster-beds are torn to pieces by the boring sponge, and covered with mud and slime, hydrioids, sea-weed and sponges, they are much less effective than those which are placed in the water just before the spawning season.

In regions where there is no danger from frost, or where the young growth is to be planted in deeper water before winter, the shells may be deposited at or even above low-water mark, and in the sounds of North Carolina, oysters thrive even at high-tide mark. The shells should be deposited in the early summer—in June, July and August—in localities where there is enough current to sweep the swimming young past them. A hard bottom is to be preferred, but this method may be employed with great advantage upon any soft bottoms which are near the surface. In this case the shells should not be uniformly distributed, but placed in piles or ridges. If these ridges are properly arranged with reference to the direction of the current, they will produce secondary currents, and will thus cause the soft mud to flow off between them. In this way any bottom which is bare or nearly bare at low tide, and which is exposed to the winds and waves, may in time be swept nearly clear of mud. Each time the tide comes in the mud is stirred up and suspended in the water, and as the tide ebbs this suspended matter is swept into the channels between the obstructions and is carried away. Shells are very effective as spat collectors. Shell wharves built out into deep water, so as to catch and turn the passing current, are often found to be covered with young oysters at all stages of growth and in good condition for planting.

The month of June is usually the best time for shelling the bottom. The early part of the month for warm seasons and shallow water, and the end of the month for cold springs, or for deep water. The quantity of shells varies according to circumstances, but in most cases 1,000 bushels to the acre are not too many.

In shallow waters, where the shells are uncovered at low tide, they may be examined, to pick out for distribution upon the planting grounds, those which have young oysters upon them; but in deeper waters the shells must be picked up with tongs or dredges, or they may be strung upon wires and sunk in deep water on suitable frames.

The chief objection to the use of shells is that the method is a wasteful one. It is not unusual for fifty or a hundred young oysters to fasten upon one shell, and as the shells are too strong to be broken without injuring the young oysters, these cannot be detached, and most of them are soon crowded out and killed by the growth of the others. The use of tiles, has therefore, been introduced in France to avoid this loss.

As tiles can be employed without difficulty in deep water, they are well adapted for use in our bay. Those which are used in France are much like a common drain-pipe sawed in two longitudinally. They cannot be obtained in our markets at present, although they could be made very cheaply if there were any demand for them. Each tile is about eighteen inches or two feet long, six or eight inches wide, concave on one side and convex on the other. The shape of the tile is important, as nearly all the oysters fasten themselves upon the concave surface. They adhere so firmly that it is difficult to detach them without injury, and to avoid this the French oyster-breeders coat the tiles with a thin whitewash, which can be scaled off with the young oysters when these are large enough to be distributed upon the planting grounds.

The aim of all methods of oyster culture is to increase the number of oysters, by furnishing proper substances for collecting the swimming embryos at the time when they are ready to attach themselves. In our waters, clean oyster shells are, in nearly all cases, the best substance to use for the purpose, and there is hardly a spot anywhere in the bay which might not be converted into an oyster-bed by this simple method of cultivation, which has been shown, in all parts of the world where it has been tried, to yield a very great return for the capital and labor employed.

There are few parts of the world which offer advantages for the prosecution of this industry equal to those afforded by the bay, and there is no other place where these advantages are presented on such a great area of bottom. Our oyster grounds, of course, vary in value, according to local conditions, and oyster culture is much more easy and profitable in some places than in others; but, in course of time, even the soft, muddy bottoms of the deepest channels may be brought under cultivation, and there is scarcely a foot of the bottom where oysters cannot be reared. The number of oysters which the bay might be made to furnish annually is almost too great for computation, but we may very safely assert that it is greater than the total number which have been taken from our waters in the past.

All that is needed to make this great source of wealth available to our people, is permission to engage in oyster culture. When the citizens of Maryland demand the right to enter into this industry, and to reclaim their property, which is now going to waste, a new era of prosperity will be introduced, and the oyster area will be developed with great rapidity.

We have shown that, upon undredged natural beds, solid substances become so thickly covered with young oysters that they have no room to grow, so that most of them are soon crowded out and killed.

All localities are not equally favorable for the collection of spat, and in the best places the amount which can be collected each season is very much greater than the amount which is needed for stocking the bottom.

Fig. 1

Fig. 2

TILES COVERED WITH YOUNG OYSTERS

A. Hoen & Co. Lithocaustic Baltimore

This excess can be profitably used as "seed" for stocking bottoms in shallow, landlocked bays, rivers, and other places which are less fitted for the collection of spat. While oyster-planting, as the sowing of these "seed" oysters is called, does not result in the production of new oysters, it is a very profitable industry, and it admits of great development.

The profits are smaller and the labor greater than those of oyster culture in deep water, but oyster-planting requires little capital, and the shores of the bay abound in proper spots for the prosecution of this industry, the importance of which has long been recognized by our people.

There are many bottoms where there are no natural oysters, simply because there is nothing upon the ground for the spat to catch upon, or because they are not places to which the spat is carried; and there are other bottoms which are so soft that a very young and small oyster would be buried in the mud and killed, although larger ones are able to live and thrive in the mud. In all these places oyster-planting may be carried on with profit, for while it is true that the total number of oysters which are born is not increased by planting, the number which reach maturity is greatly increased; for the young oysters fasten themselves so close together and in such great numbers that the growth of one involves, under natural conditions, the crowding out and destruction of hundreds of others, which might have been saved by scattering them over unoccupied ground.

Planting also adds very greatly to the value of oysters, as they grow more rapidly and are of better quality when thus scattered than they are upon the natural beds. The culture of oysters in the deeper waters of the bay, and the establishment of new oyster-beds by collecting the floating spat upon clean shells and other proper substances, is very much more important than the encouragement of oyster-planting; but it is easy to see the very great advantages which we should derive from a thorough system of planting. Deep-water cultivation cannot be undertaken to advantage on a small scale, and it requires both capital and expensive appliances; but oyster-planting can be carried on without any great expense, and as success in it depends to a great degree upon constant, intelligent supervision, small cultivators will always have the advantage of those who attempt more extensive operations.

The most serious obstacle to the development of a great planting industry in Maryland is the absence of all respect for private property in oysters. In enclosed or artificial ponds oysters would be much more safe from theft than in open water. Under our present system oysters are often sacrificed or sold at unremunerative prices, because there is no way to keep them in good condition until they can be sold to advantage. A system of ponds after the French pattern, for the temporary storage of oysters, would be a very profitable piece of property in the vicinity

of any large centre of the packing business; and the experience of the French planters shows that the construction of storage ponds where the oysters may be kept in good order, and where they will continue to grow and to increase in value, is a very simple matter.

This industry has also the great advantage that it does not need legislative protection. It can be put into practice at once by any one who owns land which is suitable for the purpose; and our State contains hundreds of acres of low, marshy land which is now private property, although it is of little or no value to its owners. Small streams and inlets which are not navigable, and which lie within the limits of private land, may be converted into ponds like the French claires at very slight expense; and with no more labor than what is required for ordinary agriculture they could be made much more profitable than the best farming land.

## THE OYSTER. INDUSTRY.

One-fifth of the State of Maryland is covered by the waters of the Chesapeake Bay and its tributaries. This bay is the largest in the United States; and, running from north to south, it divides Maryland into an eastern and a western portion. On the one side the waters of the bay encroach on the land, breaking the "Eastern Shore" up into many bays, creeks and inlets; while the "Western Shore" makes a comparatively straight line on the map.

The Marylander, however, does not regret the great tract of land thus stolen from him by the waters, but recognizes in it his most valuable inheritance. The waters covering this extensive area of 2,300 square miles bear on their surface, and contain hidden in their depths a great store of good food, which forms a very important addition to the list of land products. Ducks, geese and other birds are shot along the shores; while the many varieties of fish, the crabs, the terrapins and the oysters offer conclusive proof as to the richness of life in the bay itself.

Of all the inhabitants of the Chesapeake, the oyster is undoubtedly the most valuable to the State. On either side of the deep channel running the length of the bay, and at certain points in this channel there are to be found, with areas varying much in size, what are known as oyster "banks," "beds," or "rocks." These beds, as a rule, lie below low water mark, in water less than forty feet deep. Further out in the channel the bottom is usually too soft and muddy for oysters, hence they appropriate the firmer ground of the shallows. In the bays, creeks and river mouths, where the water varies in depth from two or three to thirty feet, large beds have become established; while in the bay proper still larger beds have arisen. The bed extending along the shore of Anne Arundel county has been estimated to cover over twenty-eight square

Fig 1

Fig 2

TILES COVERED WITH YOUNG OYSTERS

miles. Besides this great bed there are at least half a dozen, each of half the size; while many others cover areas varying from two hundred to ten or twelve acres. The total area occupied by oyster beds has been estimated to be about one hundred and ninety-three square miles.

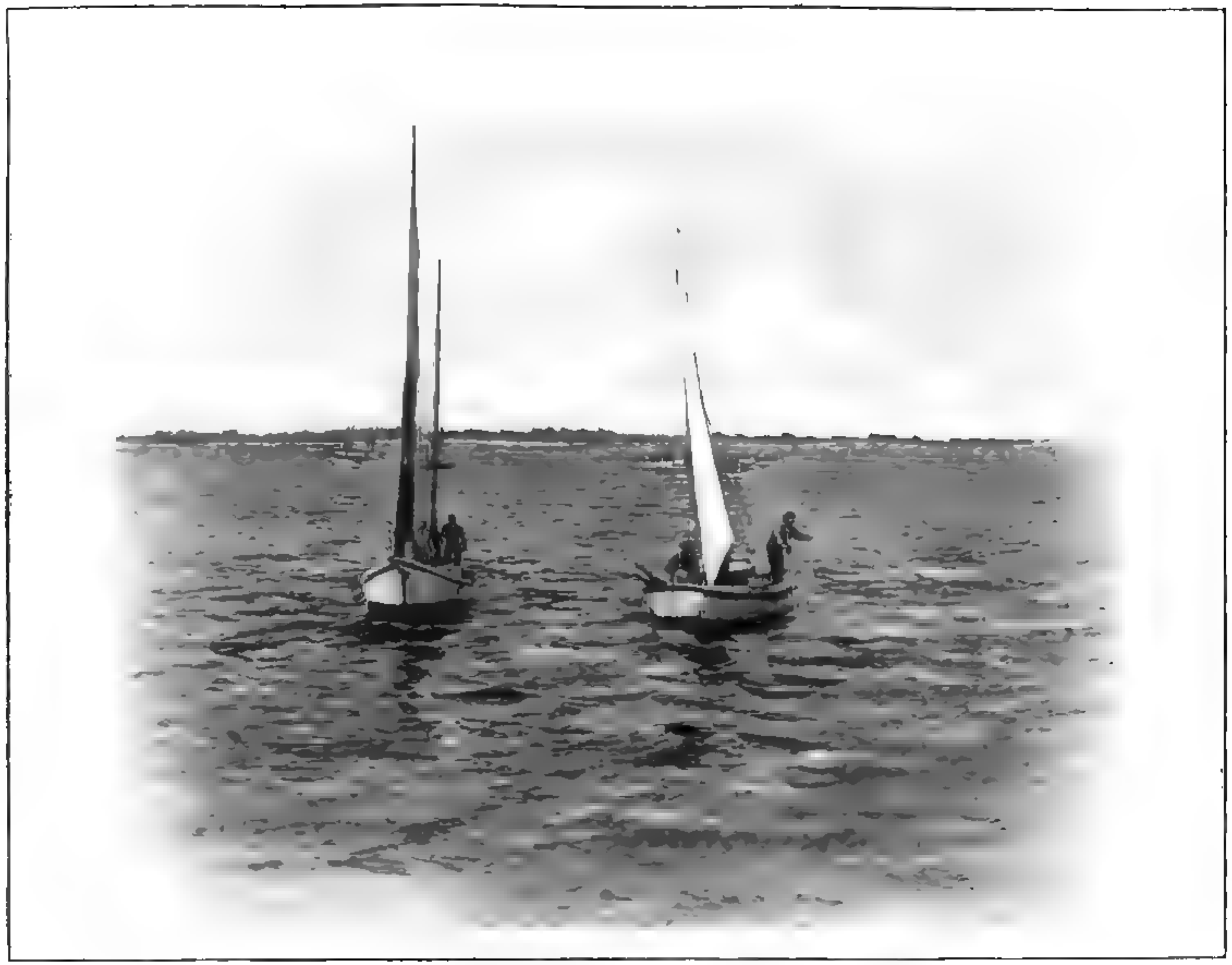
Long before white men came to America the Indians knew of oysters and valued them highly. Tribes living along shore near the beds depended largely on the oyster for their food supply. At certain times during the year large parties were accustomed to collect, and after gathering enough oysters to hold high carnival. The same practice was common to tribes living on clams and other shell-fish, and our more modern clam-bake is simply a survival of this old Indian custom. All along the coast there are at certain points huge piles of shells now overgrown with grass, which were heaped up at these annual feasts. The Indians got their oysters by wading out and picking up those near the shore, or by diving in deep water for them. When the white man came he soon introduced more efficient methods. Tongs, and later, dredges, were invented, and with the aid of these devices large numbers of oysters could be obtained in a short time. At first, and for a long time, the oyster trade was of very little importance. People living near natural beds easily obtained all they needed for home use; but of course in towns there early grew up a distinct class of oystermen, who made a business of supplying consumers with oysters in the shell. As towns sprang up along the Chesapeake, and as Baltimore became larger, the demand for oysters increased, and the class of men who depended on the oyster trade for a living grew larger and larger. During the early part of the present century the natural beds of the more northern States became exhausted by overworking, and a new phase of the industry arose. Men came from Connecticut, Rhode Island, New York, New Jersey and Delaware to the Chesapeake and bought young oysters to transplant to beds prepared for them. These transplanted oysters throve in their new homes and found a ready market, and in this way the Chesapeake became a source of supply for the markets of the States just mentioned. About 1834 a Connecticut man established in Baltimore the first packing-house. Oysters were brought up from down the bay and packed raw, to be sent as far as Pittsburg in wagons. This branch of the business received a great impetus as the Baltimore and Ohio Railroad extended further and further west. It has steadily increased up to the present time. Alongside of the packing trade there arose an important industry in the canning and exportation of steamed oysters, which to-day furnishes hundreds of inland places with a supply of this most delicious of all mollusks. The development of these various phases of the oyster industry, the increased facilities for transportation, and the steady demand have made the immense natural beds of the

Chesapeake the very centre of the oyster world. While beds in other waters have given way before the inroads of man, those of the Chesapeake, principally on account of their size and comparative immunity from natural enemies, still hold out, and even support foreign beds with seed oysters.

There are in Maryland waters two principal methods of obtaining oysters from the beds. The first method, known as tonging, is confined to beds in shallow water; while the second, that of dredging—called by the oystermen "drudging"—is used principally in deep water. Most of the boats used in tonging are small, only one, two, or three men being needed to man a boat.

The Chesapeake canoe is the most characteristic tonging boat. This is a peculiar model, formed from three dug-out logs joined together. It is pointed at both ends, has a round bottom, no deck, and sails with one or two "leg-of-mutton" sails and generally a jib. It is quite a seaworthy boat, from eighteen to twenty-five feet long, and will stand a good deal of rough handling. Another very common tonging boat is the batteau, which is flat-bottomed, built of boards, and usually sails with one sail and a jib. The batteau is of about the same size as the canoe, and these two, with one other kind, the "bug-eye"—sometimes called "buck-eye"—make up a tonging fleet. There are various interpretations of the name of this latter craft, of which, perhaps, that given by one of the officers of the oyster navy may be interesting. He maintains that the term arose from the ease with which the boat is handled; some such phase as "turned in a bug's eye," being gradually abbreviated to the term "bug-eye." The bug-eye is a larger boat than the canoe, being from twenty-five to sixty feet long, and is built of planks instead of being dug out of logs. It is sharp at both ends, but, unlike a canoe, is decked over. While a canoe carries two or at most three men, the bug-eye being so much larger may carry five or six, and thus accomplish more work. Across a tonging boat is placed a platform to be used in culling. Most canoes and batteaux carry two pairs of tongs, while the bug-eyes carry twice as many.

A pair of oyster tongs is essentially a pair of very heavily toothed rakes, attached to long wooden handles so pivoted that when they are brought together the teeth bite into each other. Above the teeth—of which there are eight or ten—there is an iron basket-work arrangement to hold what the teeth tear off. The handles of tongs vary in length from seven to twenty-two feet, according to the depth of water in which they are used. No oysters under two and a half inches long are lawfully marketable; hence the necesssity of "culling," which consists in separating the larger oysters from undersized ones and empty shells which come up in the tongs. The small oysters are returned to the water.



TONGING FOR OYSTERS

Watching a couple of men tonging in a canoe, you will see that they divide the labor between them, one tonging while the other culls. The tonger, seizing the handles of his tongs, allows the heavy irons to slip down into the water until the handles stand up vertically before him. Now by spreading the handles apart he opens the teeth, and after closing and opening them again several times, until he feels that he has a good hold on a bunch of oysters, he slowly raises the tongs and dumps the catch on the culling-board. As soon as the board is full, the culler picks up his hammer and begins rapidly to break up the clusters of oysters, throwing the small ones overboard and the large ones into the boat. After a time tonger and culler change places. When there are three men in the boat, two tong while the third culls until the others give him more oysters than he can handle, when one of the tongers helps him.

A fleet of tongers at work is a very pretty and quite a lively sight. Almost any clear day during the winter, if it be not too windy, tongers may be seen busy from nine o'clock in the morning until five in the evening.

The little boats are anchored over the bed for acres around, bobbing up and down on the waves, their sails down and their crews busily engaged with the tongs. The splash of the tongs, the chipping of the culler's hammer, an occasional call from boat to boat, or a snatch of a song, with the active motions of the men, combine to form a cheerful and lively scene. But there is a dark side to the picture. The freezing water splashed up by the tongs, the handling of cold, wet oysters, the severe muscular exertion of tonging and culling, all tend to make this occupation one of great hardship. Only the hardiest can stand such a rough life, and it has been said that "the death rate among oystermen as compared with other trades is very high;" "the injury to health from exposure is such that few reach old age." The risks and hardships involved in this occupation have a very bad influence on the men as a whole. Most of them have no higher aim than to get through the winter months, during which tonging is allowed, with as little work as possible. Being forced to stay in when the weather is bad, they take holiday at all other times they can. The necessity of earning money enough to live on is the only thing that keeps these people at work. Reckless of the future, they only live for the moment, and most tongers spend their earnings as soon as they get them. Hence they are proverbially poor. Some of the men, however, work with great regularity, and make a good living. During the summer months the law forbids oystering, and then many of the tongers become fishermen, others catch crabs, while some work on farms. Many own their own little houses, and

during the off months do no work except the little required to keep their gardens cultivated.

Before considering dredging, a method of tonging occasionally used should be mentioned—the taking of oysters with the "nippers." "Nippers" are very much simplified tongs. They are merely two small rakes with four or five long teeth each, fitted to handles which work like those of the tongs. This instrument is used in calm water, where the man in the boat can see the largest oysters on the bottom, and pick them up one by one. The method is slow and difficult, and is not much used.

The dredgers may be divided into two main classes; "dredgers" proper, and "scrapers;" the only difference between the two being in the size of the boats and dredges used. There is no special dredging vessel, just as there is no special form of tonging boat. Any sloop or schooner from five to seventy-five tons may be rigged up as a dredger. The "oyster pungy," however, is perhaps peculiar, and best adapted to the needs of the dredger.

This is a schooner of about ten tons, with a deep keel, steep sides, and a flush deck. The last point is an advantage to the dredger, for when a boat with a bulwark is used, this must be cut away on either side, at the place where the dredge comes up. Fixed firmly to the deck in this position there is an iron windlass, working by a crank, attached to which is a long rope with the dredge fastened to the end. The dredge is a heavy iron framework, to which is hung a bag made of iron rings. Across the frame, at the mouth of the bag, there is a strong blade. In the larger dredges this blade bears heavy teeth, while in smaller ones, known as "scrapers," the teeth are absent, a sharp edge taking their place.

Scraping is done with the smaller boats of this class; generally under ten tons, carrying about five men, and confining their operations to comparatively shallow water. These boats seldom make any extended trips, usually returning to port after a day's work. The larger schooners on the other hand carry twice as many men, and when starting off for a trip take enough provisions for several days.

Dredging, like tonging, is anything but a pleasant, easy occupation; and the crew, white and colored, crowded in a small cabin reeking with smoke, living on the coarsest fare, and exposed to rain and snow, cold and ice, have a very hard time of it. When they reach the beds in deep water they drop the dredge overboard, and at the same time let the rope run out behind by which the big iron bag is dragged along over the bed. As the teeth of the blade across the mouth of the dredge catch the oyster-shells, they tear off whole bunches and the bag is soon full. After a time the vessel comes up somewhat into the wind, and the men

DREDGING FOR OYSTERS

AN OYSTER PUNGY, WITH DREDGER AND WINDLASS.

AN OYSTER PUNGY, WITH DREDGER AND WINDLASS.

a crew completely under control and ready to face the officers of the law. Several severe engagements took place, in which the police were treated very roughly. At present there is little disturbance among the oystermen, but occasional outbreaks show clearly the need of more efficient control of a class of men who do not hesitate to defy the law and consider themselves the judges of their own rights. It is only by constant vigilance that the oyster navy, commissioned by the State in 1868, manages to keep things comparatively quiet. The oyster navy consists of fifteen boats—two steamers, each carrying a small cannon and twelve repeating rifles, and thirteen sail, likewise well armed. The sailboats are stationed all along the shores of the bay, each having its particular beat, while the two steamers, besides keeping these local boats to their duty, have important general work of their own. They must enforce the culling laws, examine licenses—for each Maryland dredger or scraper is numbered, and without the proper license none may work—keep all foreign vessels off Maryland grounds, prevent dredgers from encroaching on tongers, and see to it that the crews of dredging boats are not abused by their captains. This last duty is one made necessary by the brutal character of many of the captains, and by the great ignorance and consequent servility of the crews. Besides these unpleasant duties, however, the navy does much in a more direct way to ameliorate the condition of the oystermen. During the cold weather, when dredgers are often kept out of port by the ice, or prevented by the same reason from going to work, the steamers of the navy break a way for them and tow them through the ice. Destitute oystermen are also sure to find a friend in the navy, and thus in many ways this force, primarily intended to enforce the laws, exerts a kindly, fostering influence. Such an influence, as it gains in strength, will make the navy more efficient and more influential in promoting a better spirit in the oystermen.

When an oyster boat is loaded, she makes all haste to port, and there sells out to some packing establishment, canning house or commission merchant. Most of the oysters taken are brought directly to Baltimore, but a large number are sold further down the bay at the various towns along the shores. Approaching an oyster town from the water, one is immediately struck with the immense size of the shell heaps near the wharves, and the peculiar long, low, wooden buildings, running out over the water, with a fleet of sailboats near by. The number of oyster shells in such a town is prodigious; they are seen everywhere, and there are two or three places, like Crisfield, built on a foundation of shells.

In the winter months, during the oyster season, a visit to such a place is very interesting; especially if, as was the case this last winter, the ice has imprisoned three or four hundred tongers, dredgers and scrapers along

UNLOADING AND MEASURING OYSTERS.

the wharves. Unless the freeze is a long one, though the fleet is laid up, the packing houses can work without interruption, for they always keep a supply of oysters on hand. The packing establishment is a collection of low, wooden houses, built at the water's edge, so that the boats may unload easily. On one side is placed a large wooden shed for receiving the oysters as the boats bring them in. This shed opens into a long, low room, where the oysters are removed from their shells by the process known as "shucking," and passed on into the packing-house. The oysters are raised from the boat's hold by horse-power, and wheeled in barrows to the storage shed, where great piles of oysters—1,200 to 4,000 bushels—are heaped up to serve as a supply for the next room. The shucking room is the most interesting part of the whole establishment. From end to end run two, three or four rows of tables, with broad aisles between. At one side of the room is a stove, and at one end is a window, opening into the packing-house. Usually the rooms are well lighted by numerous large windows, and are quite comfortable places on a cold day. The wooden tables are long, heavy affairs, and the shuckers stand in lines in front of them, each in a separate stall, with a pile of oysters on the table to the left, while a bucket is placed on the right, and on the floor a pile of oyster shells.

Men and women, boys and girls work side by side, standing in their stalls all day long, and, as a rule, working pretty steadily, often under the eye of an overseer. The process of "shucking" is extremely interesting to watch, but very difficult to imitate without much practice. There are two methods used in shucking; one with the hammer and knife, while with the other only the knife is used. In this latter process, known as "stabbing," the shucker picks up an oyster with his left hand, deftly inserts a thin-bladed knife between the shells, then with a turn of the wrist and a twist of his knife he lands the oyster in the bucket on his right, and throws the shells down on the floor beside him. The whole operation is so quickly yet so accurately done that the observer is confused and mystified. It is only after close watching that one sees in these apparently careless motions a series of distinct separate acts, so nicely co-ordinated, that a good shucker works with the precision of a machine. In the right hand is held the knife with a thin, pliant blade, while on the other hand there is usually worn a padded glove with the fingers cut off. An oyster is seized and held down on the table by the left hand, with the broad end, popularly known as the mouth, directed to the right. Next the knife-blade is skillfully slipped between the shells, and with one quick motion the oyster is cut off from the lower shell. The left hand now picks up the upper shell with the oyster attached, at the same time turning it over. This motion is almost simultaneous with the last, which separates the oyster from the lower valve, a turn of the

left wrist helping the knife and bringing the oyster uppermost at the same time. The knife is now caught so as to leave the right forefinger free, and as the blade slips, in the last motion, under the oyster, the forefinger is laid upon it to hold it to the blade. Finally, by almost a single motion, the oyster is tossed into the bucket from the knife, while the left hand throws the shell to the floor. In this way most workers open about twenty oysters a minute, and soon wear a groove in the table, where they hold the rough shell in the first motion. The other method of shucking—with the hammer—is quite different, and not so rapid. The hammer breaks the mouth of the shell, which is held in the left hand, and then it is an easy matter to insert the knife, which is taken up on laying down the hammer. Now the oyster is picked up by the left hand and held, while the knife cuts it from the upper shell, and at the same time flings this off.

By the next motion the lower shell is removed and cast aside, the oyster landing in the bucket. Formerly, instead of hammers, knives, with heavy handles, were made, by which the shell was broken along the edge; the knife was then reversed and used in cutting, as just described. In some establishments each shucker has two buckets, one for large, choice oysters, and the other for average sizes. As the piles of shells grow around the shuckers, they are wheeled outside and dumped, thus giving rise to the huge shell heaps seen all along the water-front of an oyster town. The workers are kept supplied with oysters wheeled in from the storage bins. The work is not apparently as hard as that of the oystermen, but is still fatiguing and laborious, and the shuckers are frequently compelled to stop work to warm their hands, which would otherwise soon become numbed from handling cold oysters. The shuckers are perhaps a better class than either the dredgers or tongers. Many shuckers work pretty regularly, earning from \$2.50 to \$3.50 a day, own their own little houses, and get along fairly well. The majority, however, are poorly clothed, dirty, shiftless, and ignorant, simply working because compelled to do so; never aiming to better their condition. On the Eastern Shore almost all the employés are negroes, and it would be hard to find a more picturesquely shabby crowd. In spite of their poverty and generally miserable condition, it is a real pleasure to see these people at work. There seems to be a sort of fascination for them in the act of shucking. As the work goes on, some one with a powerful voice starts a negro hymn, and soon the whole room-full is singing with the energy and fire of a camp-meeting. Singing seems to be a sort of compensation to the poor shuckers, for their hard work and impoverished state.

As soon as a shucker fills his bucket, he takes it to the window which opens into the packing house. In the packing room, just under

AN OYSTER PACKING ESTABLISHMENT

AN OYSTER PACKING ESTABLISHMENT

this window, stands a large strainer, or colander of tin, as big around as a tub. A man, whose special business it is, takes the bucket of oysters from the shucker, and empties the contents on the strainer. Fresh water is then run on to wash off small pieces of shell and dirt, together with the natural liquor of the oysters. The oysters are scooped up into a quart measure, and poured into large tubs of fresh water. A gallon of such oysters is known as a "gallon dry measure"; and, as the shuckers are paid by "dry measure," it is to their interest to lose all the liquor they can in shucking, A record is kept of every gallon handed through the window; in some places the shuckers receiving a check for each gallon as it is brought in. At the end of the day twenty cents is paid for every gallon shucked, some of the workers making as much as $3.75. After a good washing in the tubs, in which, in warm weather, large cakes of ice are floating, the oysters are packed.

In towns down the bay the fresh oysters are simply fastened up in barrels, half-barrels or kegs, and shipped by rail, the barrels having ice in them.

In Baltimore wooden buckets and tin cans, packed in large cases surrounded with ice, are chiefly used. When emptied by consumers, the buckets and cans are usually returned to the packer.

Another method of shipment for distant points is found in the steamed-oyster trade. Oysters are unloaded from the boats into little cars of iron wicker-work, holding two or three bushels each, which run out on the wharf near the steaming-house. When loaded, three of these cars at a time are run into a long steam-box, in which they are shut up and subjected to a high temperature for three or four minutes. When sufficiently steamed the oysters are shucked, it being an easy matter to remove them from the shells when dead and gaping open. They are then put up in cans of various sizes, heated again, soldered up, and finally heated a third time for a few minutes. After cooling, the cans are labeled, packed and shipped all over the country.

The large canning and packing establishments in Baltimore often have kilns connected with them, in which the shells are burnt to lime. Fertilizing companies also burn great quantities of shells for the lime. Besides this, shells are of use as ballast in boats, to fill in low land, etc., etc. The very important use of shells in forming new oyster beds is not practiced in Maryland, since there is no such thing as artificial cultivation here.

The following extracts from the report of the United States Commissioner of Fish and Fisheries, Colonel Marshall McDonald, will give an idea of the magnitude of Maryland's greatest industry:

"The returns indicate that in 1891, 32,104 persons were directly engaged in the industry; that the capital invested was $6,697,302, and

that the value to the fishermen of the oysters taken was $5,295,866. Comparing these figures with the aggregate for the entire fishing interests of the Coastal States of the United States, it is seen that the oyster industry of Maryland gave employment to nearly one-fourth of the persons engaged; represented nearly one-sixth of the capital invested, and yielded more than one-seventh of the money returned."

"Of the 32,104 persons directly engaged in the industry, 11,293 were factory hands," employed in the canning and packing houses. The 28,811 remaining were chiefly tongers and dredgers. There were, roughly speaking, about 7,000 boats, tongers, dredgers and scrapers; 5,000 of which were tongers. The total catch for 1891 is stated to have been 9,945,058 bushels, of which the dredgers took 5,475,725 bushels, while the tongers are represented by 4,469,333 bushels.

From this short sketch of the most valuable interest of the State, it is readily seen that if Nature unaided is so bountiful, when once modern methods of artificial cultivation shall have been adopted, there will be a vast increase in the production and a rich source of revenue to the State. The ignorance and indifference of the oystermen to all but their own immediate interests have hitherto had influence enough to thwart all attempts at the introduction of improved methods, and a system of regulations to prevent the depletion of the beds, such as other States have adopted with the best results; but the eyes of the public are being opened to the real state of affairs, and the magnitude of the interests at stake, and there is good reason to hope that this great field of industry and source of wealth will not much longer be mismanaged and destroyed.

## CHAPTER IX.

### COMMERCE AND TRANSPORTATION.

The history of Maryland commerce is as old as Maryland itself. It begins two hundred and fifty years back, with a condition of absolute dependence upon English shipping, and this dependence it was the avowed policy of the mother country to establish and maintain. During the early years of the Province, an English Order in Council provided that "no tobacco or other production of the colonies should thenceforth be carried into any foreign parts until they were first landed in England and the duties paid." The Navigation Act of 1651 further restricted trade to English built ships, and for the next hundred years an uninterrupted series of restrictive measures combined to confirm the commercial vassalage of Maryland. Agents were established by English merchants at many of the old river towns of the Province, whither tobacco, securely packed in hogsheads, was rolled from adjacent plantations—weighed, paid for, and stowed aboard English bottoms waiting at the landing. In 1761 Maryland trade engaged one hundred and twenty vessels, with an aggregate tonnage of 8,000 tons, of which only some thirty vessels, of a total burthen of 1,300 tons, were owned in the Province. With the events and consequences of the Revolutionary War, the situation underwent radical changes. Commercial restrictions were thrown off, and trade in the great staples of the State stimulated. Natural advantages of location began to assert themselves; local accumulations of capital led to independent purchase and direct shipment, and Maryland ports rapidly assumed commercial prominence.

Between the close of the Revolutionary War and the outbreak of the War of 1812, there was an extraordinary expansion of Baltimore trade. Continental wars not only increased the demand for Maryland staples, but largely diverted the West India trade to this safer port. The rise and perfection of the "Baltimore Clipper" aided the opportunity, and during the whole period of which we are speaking, Baltimore enjoyed the chief part of European and West Indian commerce, together with no inconsiderable share of the world's carrying trade. The volume of Maryland exports increased from $2,239,691 in 1791, to $5,811,380 in 1795, to $9,151,939 in 1804, and to $14,298,984 in 1807. During the war of 1812,

the commerce of the State was largely suspended, but thereafter it developed with renewed vigor.

Baltimore was the natural market for the agricultural products of the interior and western country. Active communication had long been maintained with this vast region; in early days by pack-horses, later by long wagon trains that traversed the great northern turnpikes as far as the Ohio River. The introduction of steamboats upon the navigable waters of the West displaced this means of transportation. Improved systems of communication had been established by New York and Pennsylvania, and a deflection of trade to these centres was threatened. Public-spirited citizens immediately began an agitation to supply the need, and the Chesapeake and Ohio Canal Company was incorporated in 1824 for the purpose of constructing a canal from tidewater on the Potomac to the Ohio River. Several years later, when estimates of the enormous cost of the canal rendered its immediate completion improbable, a supplementary project was proposed—a railroad from Baltimore across the mountains to the Ohio. In February, 1827, the first railroad charter granted in the United States was given by the General Assembly of Maryland to the Baltimore and Ohio Railroad. The work of actual construction was begun in the following year. In 1853 the road was completed to the Ohio River, and in 1857 direct connection was secured with St. Louis. The Chesapeake and Ohio Canal was opened in 1850 for through navigation from Georgetown to Cumberland. These great arteries form an organic part of the commercial history of Maryland. They opened up a vast undeveloped region, and secured for the metropolis of the State a large measure of the advantages suggested by its natural location as a seaboard market and distributing depot for the West.

Both trade and commerce suffered severely from the Civil War. Communication with the South was completely cut off, and Western trade temporarily diverted to other channels. But the causes of prosperity were suspended, not destroyed, and as the prostrate industrial life of the country revived, the trade centres of the State emerged into enhanced importance. The vigor and activity of those early days has never waned. The commercial prosperity of Maryland is historical in its growth, the product of unexampled natural advantages, and permanent in its stability and strength.

### BALTIMORE.

Baltimore is located at the head of navigation, on the Patapsco River, thirteen miles above its entrance into the Chesapeake Bay, and one hundred and seventy miles from the Atlantic Ocean, at Cape Henry. The Patapsco River, from the city to the bay, is really an arm of that magnifi-

cent estuary, as the fluvial waters under this name terminate near the southwestern boundaries of the city, from whence to its junction with the bay, it forms a spacious tidal basin, averaging two miles in width, with from 18 to 22 feet natural depth at mean low water. This location, one hundred and seventy miles inland, connected with the Atlantic by the wide and deep waters of the Chesapeake Bay, marked Baltimore in the early days of the State as a natural point of transfer for the commerce between the interior of the continent and foreign countries. From the long-ago days, when swift privateers roamed the seas, and the "Baltimore Clipper" was the admiration of the nautical world, until now, Baltimore has held a foremost place among Atlantic sea-ports. More, perhaps, to natural location, than to any other single cause, is this due. The Patapsco River offers bold water on both sides for many miles of frontage, as does the Chesapeake Bay to its mouth. Elevated rolling lands slope down on either hand to sandy beaches. The fluctuations of the water level, due to the tidal movement (only about eighteen inches), are so slight that in either bay or river, navigation is unhindered by the impeding currents so often found at other ports. For the same reason no swinging or floating stagings are necessary for the lading or discharge of cargoes or passengers, nor expensive closed docks to keep vessels afloat at varying stages of the tide. For seven miles on one side, and for over three miles on the other, railways are in operation, by which every foot of water front can be connected, at small cost, with any or all of the railway systems of the country. In a word, no city on the Atlantic coast offers, by reason of natural situation, facilities for the extension of commercial business superior to those presented by Baltimore.

*Ship Channel.* In the days when the commerce of the world was borne by sailing vessels, and a ship of eight hundred tons was considered a large one, the natural depth of water in the Patapsco was ample for all the requirements of a commerce which spanned the Atlantic, embraced both shores of the western hemisphere, and covered the waters of the Pacific and Indian Oceans with the sails of Maryland ships. As, however, in answer to the demands of commerce and the requirements of the most economic methods of ocean transport, the size and tonnage of vessels steadily increased, until the coasting schooner exceeded in tonnage the old Liverpool liners and Indiamen, and steamships of 4,000 tons burthen were classed among the smaller transports, it became evident that if Baltimore was to maintain her commercial importance the depth of water in the channels of the river must be increased by dredging.

The first efforts in this direction were began forty years ago, the city, State and federal governments acting in conjunction, and looked to the opening of a channel twenty-one feet deep at the mouth of the river,

where the natural depth was not over eighteen feet at low water. With large contributions from the city, added to the appropriations by the government, this work of improvement has been steadily pushed forward with ever increasing demands for increase of width and depth of waterway, to meet increasing size and tonnage of vessels. The ship channel leading to this port has now a least width of six hundred feet and a depth of twenty-seven feet at mean low water, sufficient, at least for the present, for the largest ocean steamers. It may safely be asserted that should the necessity arise, additional width and depth will promptly be provided, if necessary, by the city alone, whose contributions, heretofore, have materially hastened the completion of the work.

*Harbors.* At the entrance to Baltimore harbor, the Patapsco River divides into the northwest, southwest and middle branches. The northwest branch pierces two and a half miles into the very heart of the business portion of the city, affording miles of water front, within easy reach of the main thoroughfares of the eastern and central sections. The southwest and middle branches envelope the southern and southwestern sections, giving a long expanse of water front, in close proximity to the lines of the Baltimore and Ohio Railroad. The main harbor, or that on the northwest branch, is surrounded by the older portions of the city, and contains grain elevators, steamship piers, railroad terminals, dry dock, floating docks and marine railways. This harbor has a water front measured on the pier head line of six and a half miles, an area of six hundred and thirty acres, and while leaving ample fairways for the movement of vessels, furnishes ninety-six acres of anchorage grounds, on which the least depth of water is nineteen feet. The whole of the lower portion of the harbor, covering the elevators and steamship piers, has a depth of twenty-seven feet at mean low water. The harbor along the southwest and middle branches has, within the city limits, and measured on the pier head line, a water front of five and a half miles, and nearly as much more on the opposite banks, in the county. It covers an area of thirteen hundred acres, and has channels of seventeen feet depth at mean low water. The total water front within the city limits, if fully improved, would furnish at least fifty miles of wharf room, allowing docks of one hundred and fifty feet in width. In addition to these commercial facilities within the city, there are nearly ten miles of water front on the Patapsco, below the city, with railroads in operation near it, on both sides of the river.

As the harbor of Baltimore is the receptacle for most of the drainage of the city and an extensive area of back country, a large amount of dredging is annually required to maintain the specified depths of water in the various sections of the harbor. This work is done entirely by the city, under the immediate direction of an unpaid Commission, known as

B & O RAILROAD ELEVATORS &c LOCUST POINT BALTIMORE

the Harbor Board, who also are conservators of the laws regulating the construction and repair of wharves, and of all laws touching the general preservation and maintenance of the harbor and the navigation of the river and harbor.

*Port Charges.* There are, strictly speaking, no port charges at Baltimore, except clearance, register and license fees, paid to the Federal Government through the Collector of the Port. These are the same at all ports of entry in the United States. What are ordinarily classed as port charges—that is, cost of wharfage, stevedoring, tonnage, etc.,—fluctuate from time to time, but always within reasonable limits. There is, however, no charge for wharfage at elevators when grain is taken on, and it is generally conceded that all incidental expenses of this kind are lower in Baltimore than at any other Atlantic port.

Baltimore has not, however, become a great exporting centre and distributing point by means of natural advantages alone. Local enterprise and ready capital have provided ample means of communication and unsurpassed facilities for the receipt and distribution of commodities to the world's markets. It is to the consideration of these that we now naturally turn.

### STEAMSHIP LINES.

Some twenty regular lines of steamers are engaged in trade between Baltimore and important European and South American ports, in addition to a large number of "tramp steamers" and several lines of sailing vessels.

Of the regular steamship lines, the North German Lloyd has a service of fine vessels between Baltimore, and Bremen and Southampton. Sailings are weekly, and the passage is ordinarily made in twelve days. Passenger travel has assumed large proportions on this line. The Allan Line, between Baltimore and Liverpool, calling at Halifax, makes sailings fortnightly, and in the summer season with more frequency. The fleet consists of five vessels, fitted with all conveniences for passenger traffic. The Johnston Line trades between this port and Liverpool and London, and is particularly active in cattle, grain, cotton and lumber transportation. The Lord Line has a bi-monthly service from Baltimore to Belfast and Dublin. The Donaldson Line offers facilities to shippers to Glasgow; thence to Scotland, Ireland and the northern parts of England. The Atlantic Transport Line runs a large fleet of steamships between Baltimore, and London and Swansea. The Neptune Line plies between Baltimore and Rotterdam, as does also the Royal Netherlands Line, with fortnightly sailings. The Bristol Channel Line sails monthly to Bristol, and the Empire Line at similar intervals to Leith, Scotland. The Blue

Cross Line plies weekly between Baltimore and Havre. The Puritan Line despatches steamers every ten days to Antwerp. The Pinkney-Furness Line carries freight to various European ports; the Hooper Line, to Liverpool, and the Hamburg-American Packet Company, to Hamburg. The Earn Line has a series of vessels between Baltimore and Santiago-de-Cuba, Cuba, with occasional voyages to Rio de Janeiro, Brazil. The Hammonia Line carries freight from Baltimore to various Brazilian ports.

The coast trade of Baltimore with northern and southern ports has assumed large proportions and engages several important lines of steamers equipped for passenger as well as freight traffic. The Merchants' and Miners' Transportation Company maintain nine large steamships with regular sailings to Norfolk, Boston, Savannah, and Providence. The Bay Line has a series of fine steamers running nightly to Norfolk, where important connections are made with the South. The New York and Baltimore Transportation Company operate between Baltimore and New York, and the Ericsson Line between Baltimore and Philadelphia, by way of the Chesapeake and Delaware Canal. The Richmond and York River Line has a fleet which runs to West Point and Richmond, where connections are made with the Richmond and Danville Railroad.

Trade with the bay and river ports of Maryland employs a whole fleet of vessels. The principal companies engaged in this traffic are the Eastern Shore Steamboat Company, Weems Transportation Line, Maryland Steamboat Company, Chester River Steamboat Company, Sassafras River Steamboat Company, Choptank Steamboat Company, Wheeler Transportation Line, Maryland and Virginia Steamboat Company, Tolchester Steamboat Company and others. There are in all about fifty bay steamers, ranging in tonnage from 250 to 800 tons, many with excellent passenger facilities in addition to freight accommodations. During the busy summer season they make daily trips, while in the winter months, when the business is lighter, four trips per week suffice. In addition, innumerable schooners, pungies, and bugeyes run throughout the year, bringing a vast assortment of produce to Baltimore markets.

### RAILROADS.

The advantages of inland location have been emphasized and developed for Baltimore by the construction of direct lines of railroads, placing the city in proximity, nearer by many miles than Northern and Eastern rivals, to the great productive sections of the country. By the shortest rail line, Baltimore is thus ninety-six miles nearer points in the South than Philadelphia, one hundred and eighty nearer than New York and four hundred and thirteen nearer than Boston. With

respect to Cincinnati, its advantages over these cities are respectively seventy-four, one hundred and sixty-four and three hundred and thirty-two miles, and in regard to other Western points they are even more decided. The railroad facilities of Baltimore include five distinct standard-gauge railroads and one narrow-gauge road, now being changed to standard-gauge. The vantage ground upon which they place the commercial interests of the city have been vividly described as follows:

"Baltimore stands with her face to the south, and with one hand prepared to gather the products of nearly half of the United States and to send them forward to other nations, and in return with the left hand to bestow the peculiar products of the soil of Maryland and her sister States upon those States whose climate will not allow the growth of such luxuries. One iron finger runs almost due north, through the rich farming lands of central Pennsylvania and southwestern New York, until it touches the great lakes, with their ships loaded with grain. Another stretches out into manufacturing Pittsburg, 328 miles distant, the coal, coke, lumber, iron and other mineral lands of southwestern Pennsylvania, western Maryland, West Virginia and Ohio, and away to Chicago, 830 miles, the central point for the grain, hay, cattle and other farm products of the great northwest, and the flour of St. Paul and Minneapolis, 1,296 miles from the seaboard. The third finger beckons to the stock-raisers of Kentucky and Tennessee, the active men of St. Louis, 931 miles to the west, and of Kansas City, 1,213 miles away, and bids them to turn towards Baltimore the rapidly-increasing shipments of cattle and cereals from the empire of the southwest. The index finger very appropriately follows the lines of the Appalachian system of mountains, which, ranging from the southwest to the northeast, give an outlet to Baltimore by the natural rift at Harper's Ferry, whose immense water-power, gradually being utilized, must bear tribute to this city. Down through the beautiful, fertile and well-watered Shenandoah Valley of Virginia the finger points, gathering in the profits from the farm lands of the valley proper, the wood and minerals of the mountain slopes, the coal and iron of the southwestern Virginia and southern West Virginia hills with the cattle of their plains, piercing the pine and hard-wood regions of western North Carolina and South Carolina, east Kentucky and Tennessee, and finally touching the flourishing manufacturing and industrial centres of the new south, Birmingham, Anniston, Ensley and other towns and cities of Alabama, which have grown with the development of its natural resources. The broad thumb covers a fertile section embracing Richmond, Norfolk, Atlanta, Savannah and Charleston, and some of the finest traveling country on the Atlantic slope, extending from Norfolk to Florida."

A few words of detail may be added to this summary:

The Baltimore and Ohio Railroad is so intimately connected with the commercial development of Baltimore as naturally to attract the first consideration. Historically, the first railroad in the United States, it has become, by extension and incorporation, one of the great trunk lines of the country, forming an organic system of more than 3,000 miles. In one direction, it extends to Philadelphia, thence by direct connection to New York; in another, it penetrates the vast regions of the West, Southwest and Northwest, through the States of Maryland, Pennsylvania, West Virginia, Ohio, Indiana and Illinois, to the waters of the Mississippi. Connections at such important centres as Philadelphia, Washington, Pittsburg, Wheeling, Cincinnati, Chicago and St. Louis give direct access to all sections of the country. The local tide-water terminals of the system are situated in the main at Locust Point, and are planned on an extensive scale. Several acres of ground are occupied by tracks and freight houses, while a large water frontage and immense piers render possible the transfer of freight from ocean steamers to cars, or vice versa, with the utmost facility and economy. Two enormous grain elevators for export delivery, located here, have a capacity of 1,500,000 and 1,800,000 bushels respectively. A third, for local traffic, situated near Camden Station, has a capacity of 200,000 bushels. Massive piers are fitted for immigrant traffic, and make it almost possible for the new arrival to step from steamer to train. On the east side of the harbor are found additional piers and large shifting yards. The central station of the road is conveniently located on Camden near Howard street. Exit from the city to eastern points has, up to the present time, involved ferriage across the Patapsco River from Locust Point. This will be obviated by the Belt Line tunnel, which pierces the heart of the city to its outskirts. Plans have also been completed for the erection of a handsome central passenger depot at Lombard and Liberty streets.

The Northern Central Railway serves to connect Baltimore with the great Pennsylvania system, and, at the same time, affords a direct outlet to the North. It penetrates the rich agricultural section of central Pennsylvania and southwestern New York up to the great lakes, thus pouring into Baltimore an enormous volume of corn and wheat for export. Direct connection with the coal region of Pennsylvania brings to the city a heavy tonnage of anthracite and bituminous coal. The tide-water terminals of the road are located at Canton, and occupy several acres of ground, with an extensive water front. Grain elevators of large capacity, merchandise piers, immense docks and warehouses are also situated here and provide admirable facilities for handling and transferring ocean freight. The city terminals of the city are the Calvert Street, President Street and Union stations. The general offices of the

PENNSYLVANIA RAILROAD COMPANY'S ELEVATORS, &c., CANTON, BALTIMORE

road are located within a block of the main passenger station on Calvert street. Close by are the chief inland freight stations, covering several blocks. Two associated branches of the Pennsylvania system, the Baltimore and Potomac, and the Philadelphia, Wilmington and Baltimore, connect Baltimore respectively with Washington, and with Philadelphia, New York and the East.

The Western Maryland Railroad is essentially a Baltimore road. Its construction was made possible by municipal aid, and at the present time it renders a large area of Western Maryland and the rich counties of Southern Pennsylvania almost exclusively tributary to Baltimore. The main line of the road extends west from Baltimore, through Westminster to Hagerstown, then on to Williamsport on the line of the Chesapeake and Ohio Canal, to Cherry Run, West Virginia. Branches extend to Gettysburg, Waynesboro', Shippensburg, York and Chambersburg, Pennsylvania. Direct connection with the Philadelphia and Reading Railroad gives access on the one hand to Philadelphia and the coal regions of Pennsylvania, and with the Norfolk and Western on the other, to the industrial centres of the South. The terminals of the road are conveniently located in the eastern section of the city, with passenger stations at Hillen, Union, Pennsylvania avenue and Fulton avenue stations. The road holds a franchise from the city of Baltimore for an extension through the city along Jones' Falls to Locust Point, and the erection of tidewater terminals.

The Baltimore and Lehigh Railroad, originally a narrow-gauge road, extends from Baltimore, through Baltimore and Harford counties and Southern Pennsylvania, to York, Pennsylvania, a distance of seventy-five miles. The region it penetrates is rich in agricultural and mineral wealth, and capable of marked industrial development. A change to standard gauge and the extension of the road to tidewater, to Colgate's Creek, with the erection of necessary terminals, are measures now in course of completion. The passenger station of the road is on North avenue.

The Annapolis and Baltimore Short Line Railroad, designated more familiarly as "The Short Line," is a local road, thirty-three miles in length, extending from Baltimore to the capital of the State, and passing through a rich trucking section. The road employs the local terminals of the Baltimore and Ohio Railroad.

### FOREIGN TRADE.

Baltimore has been active in foreign trade from its very foundation. Before 1786 vessels entered and cleared at Annapolis and Joppa, but an independent custom house was established in that year, and duties upon local imports were thereafter collected here. In the century which has

since elapsed Baltimore has become the third largest exporting centre in the country, being surpassed only by New York and New Orleans, the latter holding second rank by virtue of its immense cotton trade. The exports of the five leading cities in 1892 were as follows:

| | |
|---|---|
| New York | $377,722,983 |
| New Orleans | 107,684,127 |
| Baltimore | 93,126,389 |
| Boston | 88,806,672 |
| Philadelphia | 60,315,880 |

The remarkable development of Baltimore's foreign trade is even more clearly indicated by a statement of its import and export values during the last ten calendar years:

| Year. | Imports. | Exports. | Year. | Imports. | Exports. |
|---|---|---|---|---|---|
| 1881 | $16,278,946 | $55,779,461 | 1887 | $13,035,880 | $49,545,970 |
| 1882 | 14,638,006 | 43,500,798 | 1888 | 12,098,629 | 45,099,334 |
| 1883 | 12,308,392 | 50,085,914 | 1889 | 15,409,234 | 62,077,610 |
| 1884 | 12,090,261 | 43,488,457 | 1890 | 15,339,312 | 72,120,083 |
| 1885 | 11,193,695 | 34,748,264 | 1891 | 18,270,000 | 79,475,175 |
| 1886 | 11,785,113 | 46,810,870 | 1892 | 14,258,575 | 93,126,389 |

The chief articles of export are corn, wheat, flour, cattle, tobacco, provisions and copper. Importing activity centres about coffee, pineapples, cocoanuts, bananas, chemicals, tin plate and iron ore. The amounts, values and direction of imports and exports for the fiscal year ending June 30, 1892, as compared with those of the preceding year, are given in the following tables:

EXPORTS.

| Articles. | Unit of Quantity. | July 1, '90, to June 30, '91. Quantity. | July 1, '90, to June 30, '91. Values. | July 1, '91, to June 30, '92. Quantity. | July 1, '91, to June 30, '92. Values. |
|---|---|---|---|---|---|
| Cattle | | 77,718 | 6,450,270 | 63,436 | 5,272,208 |
| Breadstuffs— | | | | | |
| Wheat | Bushels | 3,753,967 | 3,824,476 | 27,858,840 | 22,262,306 |
| Flour | Barrels | 2,360,768 | 12,310,787 | 3,251,612 | 16,997,379 |
| Corn | Bushels | 4,389,183 | 2,547,850 | 16,625,755 | 9,664,747 |
| Oats | Bushels | 430 | 280 | 128,237 | 45,067 |
| Rye | Bushels | | | 1,161,901 | 1,182,073 |
| Oatmeal | Pounds | | | 3,092,819 | 92,760 |
| Cornmeal | Barrels | 16,834 | 58,916 | 47,265 | 148,841 |
| Provisions— | | | | | |
| Tallow | Pounds | 22,729,701 | 1,123,941 | 37,843,389 | 1,396,163 |
| Beef, canned | Pounds | 33,379,638 | 3,044,404 | 28,100,260 | 3,040,418 |
| Beef, fresh | Pounds | 8,012,360 | 637,470 | 5,795,750 | 550,581 |
| Beef, salted | Pounds | 6,145,225 | 469,391 | 6,539,512 | 400,545 |
| Bacon | Pounds | 15,652,270 | 1,197,266 | 8,524,530 | 695,977 |
| Hams | Pounds | 5,578,126 | 540,202 | 3,623,052 | 368,467 |
| Butter | Pounds | 95,205 | 11,966 | 68,728 | 8,506 |
| Pork | Pounds | 10,350,301 | 568,803 | 9,203,630 | 555,653 |
| Cheese | Pounds | 748,925 | 91,714 | 193,004 | 28,526 |
| Lard | Pounds | 63,904,789 | 4,702,446 | 67,528,540 | 5,349,896 |
| Fruit, canned | Pounds | | 13,069 | | 27,753 |
| Apples, dried | Pounds | 602,397 | 28,415 | 3,878,365 | 338,504 |
| Vegetables, canned | Pounds | | 61,023 | | 73,917 |
| Oysters, canned | Pounds | | 42,890 | | 53,306 |
| Glucose | Pounds | 6,634,247 | 157,990 | 2,967,639 | 81,664 |
| Oils— | | | | | |
| Olio | Pounds | 4,863,748 | 633,819 | 7,637,921 | 771,646 |
| Fish | Gallons | 145,790 | 30,144 | | |
| Illuminating | Gallons | 14,708,753 | 739,369 | 10,599,399 | 417,610 |
| Lubricating | Gallons | 821,274 | 107,194 | 1,091,105 | 139,545 |
| Cottonseed | Gallons | 196,600 | 82,935 | 1,610,496 | 495,469 |
| Lard | Gallons | 262,419 | 129,427 | 145,231 | 76,918 |
| Cottons— | | | | | |
| *Sea Island | Pounds | 413,094 | 119,878 | | |
| †Other cotton | Pounds | 87,193,597 | 8,649,075 | ‡138,592,509 | 11,933,192 |
| Cloth, uncolored | Sq. Yards | 203,468 | 36,421 | 475,498 | 80,777 |
| Cloth, colored | Sq. Yards | 20,500 | 2,978 | 66,415 | 9,554 |
| Tobacco— | | | | | |
| Leaf | Pounds | 48,861,557 | 3,803,979 | 55,905,439 | 4,152,003 |
| Stems | Pounds | 7,269,630 | 114,672 | 6,233,421 | 139,580 |
| Cigars | Pounds | 312 | 5,721 | | |
| Seeds— | | | | | |
| Timothy | Pounds | 2,318,756 | 106,485 | 2,022,392 | 92,804 |
| Clover | Pounds | 9,507,872 | 688,380 | 7,873,968 | 643,227 |
| Sundries— | | | | | |
| Starch | Pounds | 4,630,860 | 207,313 | 7,236,460 | 230,689 |
| Oil cake | Pounds | 58,531,880 | 840,838 | 69,304,801 | 1,027,877 |
| Rosin | Barrels | 182,375 | 542,185 | 111,343 | 195,100 |
| Leather | Pounds | 37,769 | 13,468 | 9,758 | 3,324 |
| Copper matte | Tons | 17,618 | 3,467,587 | 19,989 | 2,713,767 |
| Paraffine wax | Pounds | 3,198,959 | 143,737 | 2,781,509 | 155,028 |
| Bark extract | | | 155,798 | | 129,664 |
| Coal, bituminous | Tons | 106,366 | 282,753 | 92,365 | 251,642 |
| Copper ingots | Pounds | 3,367,628 | 436,849 | 11,806,294 | 1,467,288 |
| Whiskey— | | | | | |
| Rye | Gallons | 17,691 | 22,767 | 101,319 | 88,472 |
| Bourbon | Gallons | 23,132 | 22,373 | 523,016 | 424,511 |
| Lumber— | | | | | |
| Boards | Sq. Feet | 26,117 | 861,798 | 36,418 | 1,109,449 |
| Staves | | | 109,715 | | 59,370 |
| Logs | | | 414,029 | | 299,151 |

*Number of bales of Sea Island cotton, 1,133.
†Number of bales of other cotton, 176,712.
‡Number of bales of other cotton, 281,292.

## IMPORTS.

| Articles. | Unit of Quantity. | July 1, '90, to June 30, '91. | | July 1, '91, to June 30, '92. | |
|---|---|---|---|---|---|
| | | Quantity. | Values. | Quantity. | Values. |
| **Metals—** | | | | | |
| Iron ore | Tons | 474,544 | 1,061,587 | 421,712 | 1,177,833 |
| Pig iron | Tons | 6,665 | 280,381 | 16,249 | 412,295 |
| Bar iron | Tons | 58 | 1,928 | 51 | 1,682 |
| Steel hoops | Pounds | ........ | ........ | ........ | ........ |
| Steel ingots | Pounds | 4,943,130 | 37,288 | 34,789 | 3,099 |
| Taggers iron | Pounds | 610,114 | 15,121 | 3,098,334 | 73,537 |
| Tin-plates | Pounds | 144,224,644 | 5,987,412 | 52,004,521 | 1,466,901 |
| **Chemicals—** | | | | | |
| Lime, chloride of | Pounds | 5,061,386 | 69,632 | 8,063,145 | 136,047 |
| Potash, muriate of | Pounds | 13,657,136 | 204,623 | 13,840,848 | 207,109 |
| Soda, nitrate | Pounds | 12,304,801 | 209,279 | 13,498,603 | 151,093 |
| Soda, caustic | Pounds | 2,743,349 | 76,153 | 2,866,806 | 84,291 |
| Soda, ash | Pounds | 51,455,852 | 743,591 | 57,463,283 | 775,824 |
| Salt cake | Tons | 6,331 | 70,796 | 6,076 | 73,588 |
| Sulphur, crude | Tons | 9,339 | 247,324 | 9,981 | 263,293 |
| **Fruits and Nuts—** | | | | | |
| Bananas | ........ | ........ | 291,678 | ........ | 162,082 |
| Cocoanuts | ........ | ........ | 41,062 | ........ | 196,967 |
| Pineapples | ........ | ........ | 156,617 | ........ | 201,331 |
| Oranges | ........ | ........ | 36,972 | ........ | 10,743 |
| Lemons | ........ | ........ | 14,748 | ........ | 36,623 |
| **Provisions—** | | | | | |
| Coffee | Pounds | 28,366,682 | 5,446,578 | 17,793,448 | 3,608,610 |
| Rice | Pounds | 774,981 | 20,232 | 1,534,062 | 29,782 |
| Rice, broken | Pounds | 8,507,354 | 151,882 | 7,072,750 | 115,072 |
| Salt | Pounds | 27,387,716 | 43,420 | 23,242,477 | 31,346 |
| Pepper | Pounds | 341,846 | 32,822 | 423,960 | 31,784 |
| Tea | Pounds | 134,406 | 34,877 | 162,380 | 33,444 |
| Cheese | Pounds | 198,706 | 32,354 | 180,600 | 29,823 |
| Sugar | Pounds | 42,271,097 | 1,319,603 | 15,599,263 | 485,331 |
| Molasses | Gallons | 77,289 | 10,007 | ........ | ........ |
| **Textiles—** | | | | | |
| Cloth, cotton | Sq. Yards | 117,136 | 16,717 | 167,877 | 21,101 |
| Cloth, woolen | Pounds | 130,938 | 138,832 | 151,534 | 150,118 |
| Wool dress goods | Sq. Yards | 561,002 | 130,656 | 215,677 | 44,386 |
| Burlaps | Sq. Yards | ........ | 51,941 | ........ | 102,343 |
| Manufacture of flax | ........ | ........ | 87,908 | ........ | 136,431 |
| **Sundries—** | | | | | |
| Guano | Tons | 3,535 | 48,775 | 1,087 | 16,280 |
| Cement | Pounds | 46,057,393 | 163,589 | 61,461,278 | 205,844 |
| Asphaltum | Pounds | ........ | ........ | 700 | 816 |
| Licorice root | Pounds | 6,272,258 | 115,850 | 11,702,700 | 196,290 |
| Linseed | Pounds | ........ | ........ | ........ | ........ |
| Fire-brick | Tons | 1,011 | 5,465 | 2,987 | 14,932 |
| China, white | ........ | ........ | 133,320 | ........ | 138,160 |
| China, decorated | ........ | ........ | 171,595 | ........ | 129,742 |
| Toys and dolls | ........ | ........ | 188,279 | ........ | 275,201 |
| **Tobacco—** | | | | | |
| Leaf | Pounds | 333,005 | 51,200 | 352,804 | 78,748 |
| Cigars | Pounds | 4,275 | 16,581 | 3,960 | 13,564 |
| **Liquors—** | | | | | |
| Malt liquor (bottled) | Gallons | 17,515 | 17,083 | 15,931 | 16,046 |
| Wine in casks | Gallons | 28,761 | 23,744 | 24,832 | 20,946 |
| Wine in bottles | Dozens | 2,993 | 10,621 | 2,522 | 16,317 |
| Brandy | Gallons | 4,577 | 9,742 | 2,795 | 7,525 |
| American Whiskey | Gallons | ........ | ........ | ........ | ........ |
| Spirits, distilled | Gallons | 15,134 | 21,061 | 66,905 | 114,606 |
| Spirits, all others | Gallons | 5,455 | 2,806 | 10,010 | 4,095 |

DIRECTION.

| Countries. | Values of Imports. | | Values of Exports. | |
|---|---|---|---|---|
| | July 1, 1890, to June 30, 1891. | July 1, 1891, to June 30, 1892. | July 1, 1890, to June 30, 1891. | July 1, 1891, to June 30, 1892. |
| Azores or Madeira Islands | 282 | .......... | .......... | .......... |
| Austria Hungary | 24,346 | 17,363 | .......... | .......... |
| Other African Possessions | .......... | 49,335 | .......... | .......... |
| Belgium | 81,789 | 86,487 | 1,729,822 | 5,934,458 |
| Brazil | 5,452,031 | 3,606,093 | 3,696,565 | 2,387,016 |
| British West Indies | 493,010 | 428,879 | 86,488 | 34,813 |
| " East Indies | 3,538 | 52,180 | .......... | .......... |
| " Guiana | 184,229 | 126,675 | 46,930 | 94,890 |
| Chili | 237,026 | 150,888 | .......... | .......... |
| Cuba | 1,924,274 | 957,685 | 374,129 | 301,208 |
| Canary Islands | .......... | 12 | .......... | .......... |
| China | 46,022 | 26,417 | .......... | 924 |
| U. S. Columbia | 26,150 | 25,030 | 21,737 | 27,044 |
| Dutch West Indies | .......... | 600 | 4,400 | .......... |
| Danish West Indies | 136 | 163 | 69,279 | 32,204 |
| Denmark | .......... | .......... | .......... | 830,965 |
| England | 8,857,275 | 4,143,999 | 32,776,226 | 33,114,112 |
| France | 101,403 | 91,081 | 3,734,660 | 11,522,851 |
| French Possessions in Africa | .......... | 1,264 | .......... | .......... |
| French West Indies | .......... | .......... | 43,376 | 58,329 |
| Germany | 1,497,989 | 1,754,374 | 8,766,793 | 15,492,283 |
| Greece | 34,794 | 3,566 | .......... | .......... |
| Hong Kong | 11,851 | 1,089 | 761 | .......... |
| Liberia | 1,184 | .......... | .......... | .......... |
| Italy | 602,591 | 745,754 | .......... | 410 |
| Ireland | 29,220 | 19,828 | 3,065,149 | 7,333,981 |
| Japan | 12,046 | 42,577 | .......... | .......... |
| Mexico | .......... | .......... | 620 | 1,365 |
| Netherlands | 92,029 | 98,321 | 5,143,292 | 16,519,990 |
| Nova Scotia and New Brunswick | 23,188 | 27,388 | 15,516 | 13,717 |
| New Foundland and Labrador | 23,331 | 22,995 | 110,729 | 75,344 |
| Portugal | .......... | 5,477 | .......... | .......... |
| Puerto Rico | .......... | 24,914 | 18,289 | 29,546 |
| Russia on the Baltic Sea | 192,440 | 25,143 | .......... | .......... |
| " " Black Sea | .......... | 173,000 | .......... | .......... |
| Spain | 254,326 | 292,970 | .......... | 4,206 |
| Scotland | 132,036 | 141,254 | 4,621,483 | 4,686,265 |
| Sweden and Norway | 39,806 | 31,731 | 12,500 | 242,078 |
| Switzerland | 54,943 | 53,918 | .......... | .......... |
| Turkey in Asia | 58,719 | 75,432 | .......... | .......... |
| " Europe | 3,965 | 97,191 | .......... | .......... |
| Uruguay | .......... | .......... | 6,292 | 8,857 |
| Venezuela | 37,775 | 16,280 | 2,151 | .......... |
| Hawaiian Islands | 22,453 | .......... | .......... | .......... |
| Sicily | .......... | .......... | 2,600 | .......... |
| Total | 20,555,687 | 13,418,253 | 64,349,787 | 98,796,856 |

*Grain.* For many years Baltimore has been an important grain exporting port, and at the present time its cereal trade is exceeded by only one port on the Atlantic coast. The natural location of the city with respect to the interior makes it the nearest point of export to central Ohio and the central valley of the Mississippi. This involves a much shorter haul, and naturally results in a decided preference for Baltimore over other seaboard cities, by grain shippers from the southern and middle West. The annual receipts average about 30,000,000 bushels, although in 1892 the enormous aggregate of 50,794,541 was reached. The bulk of this is drawn from Ohio, Indiana, Illinois, Kentucky, Iowa, Missouri, Kansas and Nebraska. During the winter months, when the great lakes and the Erie Canal are closed, the area under tribute is extended far into the Northwest. The heaviest exports are to Great Britain, Germany, Holland, Denmark and Belgium. Seven storage elevators and five floating transfer elevators provide ample facilities for the prompt receipt and rapid distribution of grain. The storage elevators have a capacity of 5,850,000 bushels. The transfer elevators can transfer 21,000 bushels per hour. The storage and delivery charges for a period of ten days are one and one-quarter cents per bushel for grain received from cars, and one and one-half cents when received from vessels. An efficient inspection department, with a chief inspector at its head, inspects and grades all grain arriving at public store-houses. The administration of the department is vested in a bureau of inspection, composed of the president of the Corn and Flour Exchange and the chairman of the wheat and corn committees. The inspection charges are twenty-five cents per car, and five cents per hundred bushels when received by vessel and delivered according to grade. The supply of flour is drawn from the West—Illinois, Indiana and Minnesota—and, in a less degree, from city mills. Of the 3,732,150 barrels forming the aggregate receipts for 1892, 3,055,458 barrels came by rail and 499,989 from city mills. Exportations are principally to Brazil, Great Britain and the West Indies. The development of the trade is seen in the following table:

## RECEIPTS OF GRAIN.

| YEARS. | WHEAT. bus. | CORN. bus. | OATS. bus. | RYE. bus. | BARLEY. bus. | MALT. bus. | CLOVER AND TIMOTHY SEED. bus. | TOTAL. bus. | FLOUR. bbls. |
|---|---|---|---|---|---|---|---|---|---|
| 1892 | 17,571,332 | 20,631,527 | 2,185,676 | 922,685 | 375,766 | ........ | 107,555 | 50,794,541 | 3,732,150 |
| 1891 | 18,743,394 | 6,928 096 | 1,687,113 | 1,206,813 | 149,149 | 150,389 | 89,942 | 28,954,805 | 3,099,399 |
| 1890 | 6,378,638 | 31,093,894 | 2,556,430 | 469,880 | 288,036 | 484,141 | 258,830 | 31,530,049 | 3,358,937 |
| 1889 | 6,889,432 | 18,354,018 | 1,969,916 | 260,300 | 628,395 | ........ | 117,196 | 28,219,257 | 3,189,572 |
| 1888 | 7,004,443 | 6,943,839 | 2,110,028 | 200,863 | †446,751 | ........ | 120,251 | 16,825,675 | 3,015,648 |
| 1887 | 13,150,486 | 9,126,699 | 1,810,280 | 111,648 | 493,479 | 333,929 | 111,482 | 25,138,003 | 3,161,263 |
| 1886 | 12,310,534 | 15,099,869 | 1,809,258 | 247,454 | 422,869 | 305,587 | ........ | 30,095,571 | 1,928,194 |
| 1885 | 8,414,114 | 15,948,828 | 1,801,794 | 293,296 | 424,946 | 266,100 | ........ | 27,149,078 | 1,589,063 |
| 1884 | 17,756,630 | 7,093,051 | 1,660,902 | 608,639 | 390,141 | 218,695 | ........ | 27,718,058 | 1,200,345 |
| 1883 | 17,146,433 | 11,779,638 | 1,192,463 | 207,483 | 308,399 | 131,407 | ........ | 30,765,831 | 1,158,380 |
| 1882 | 17,898,569 | 3,401,308 | 1,041,743 | 116,524 | 310,317 | ........ | ........ | 22,770,461 | 1,227,264 |
| 1881 | 20,933,255 | 15,486,884 | 935,616 | 178,514 | 333,785 | ........ | ........ | 37,867,054 | 1,348,257 |
| 1880 | 36,414,393 | 16,590,291 | 1,172,487 | 224,506 | 321,195 | ........ | ........ | 54,722,872 | 1,378,587 |
| 1879 | 34,634,436 | 23,162,986 | 1,616,927 | 154,331 | 259,307 | ........ | ........ | 59,827,977 | 1,333,282 |
| 1878 | 22,017,120 | 17,907,108 | 1,052,046 | 59,631 | 350,000 | ........ | ........ | 41,035,905 | 1,412,652 |
| 1877 | 7,331,540 | 21,212,399 | 831,182 | 116,689 | ........ | ........ | ........ | 29,491,810 | 1,171,248 |
| 1876 | 3,945,247 | 24,684,230 | 810,212 | 112,160 | ........ | ........ | ........ | 29,551,849 | 1,389,538 |
| 1875 | 4,409,670 | 9,567,141 | 977,514 | 74,529 | ........ | ........ | ........ | 15,028,854 | 1,391,848 |
| 1874 | 6,389,834 | 9,355,467 | 1,139,216 | 118,548 | ........ | ........ | ........ | 17,003,065 | 1,560,997 |
| 1873 | 2,810,917 | 8,330,449 | 1,255,072 | 100,519 | ........ | ........ | ........ | 12,496,957 | 1,312,612 |
| 1872 | 2,456,100 | 9,045,465 | 1,959,161 | 90,938 | ........ | ........ | ........ | 13,551,664 | 1,175,967 |
| 1871 | 4,076,017 | 5,735,921 | 1,833,409 | 88,956 | ........ | ........ | ........ | 11,734,308 | ........ |

†Includes Malt.

## EXPORTS OF GRAIN.

| YEARS. | WHEAT. bus. | CORN. bus. | OATS. bus. | RYE. bus. | BARLEY. bus. | CLOVER AND TIMOTHY SEED. bus. | TOTAL. bus. | FLOUR. bbls. |
|---|---|---|---|---|---|---|---|---|
| 1892 | 16,661,559 | 18,995,907 | 172,271 | 740,670 | 26,785 | 107,463 | 36,704,455 | 3,661,623 |
| 1891 | 16,074,292 | 4,096,234 | 546 | 796,577 | ........ | 224,064 | 21,191,713 | 2,703,715 |
| 1890 | 4,817,614 | 18,854,951 | 617,053 | 41,900 | 17,847 | 229,958 | 24,579,323 | 2,624,282 |
| 1889 | 4,507,165 | 16,617,177 | 131,990 | ........ | 21 | ........ | 21,256,362 | 2,332,805 |
| 1888 | 4,161,129 | 4,419,977 | 5,670 | ........ | 42 | 137,453 | 8,724,271 | 2,417,874 |
| 1887 | 10,717,353 | 7,158,432 | 1,422 | ........ | 84 | 85,844 | 18,048,979 | 3,081,246 |
| 1886 | 10,575,290 | 14,076,379 | 1,160 | ........ | 70 | ........ | 24,652,899 | 1,662,504 |
| 1885 | 4,575,262 | 13,752,196 | 33,620 | 33,728 | 75 | ........ | 18,394,881 | 1,093,093 |
| 1884 | 16,511,340 | 4,[illegible]93,759 | 900 | 397,980 | ........ | ........ | 21,903,979 | 437,713 |
| 1883 | 15,375,093 | 10,012,247 | 4,038 | 87,531 | ........ | ........ | 25,478,909 | 441,477 |
| 1882 | 17,564,407 | 1,371,823 | 6,262 | ........ | ........ | ........ | 18,942,492 | 463,878 |
| 1881 | 19,676,640 | 12,735,083 | 10,035 | ........ | ........ | ........ | 32,421,758 | 413,923 |
| 1880 | 33,768,965 | 14 686,908 | 19,825 | ........ | ........ | ........ | 48,475,718 | 497,042 |
| 1879 | 32,144,349 | 21,327,419 | 76,577 | 29,034 | ........ | ........ | 53,577,379 | 447,134 |
| 1878 | 19,610,791 | 16,953,458 | 19,018 | 49,584 | 34,148 | ........ | 36,666,999 | 590,150 |
| 1877 | 5,479,567 | 19,268,725 | ........ | ........ | ........ | ........ | 24,748,292 | 369,519 |
| 1876 | 1,659,861 | 20,953,724 | ........ | ........ | ........ | ........ | 22,613,585 | 426,094 |
| 1875 | 2,046,430 | 6,989,607 | ........ | ........ | ........ | ........ | 9,036,037 | 453,000 |
| 1874 | 3,556,848 | 5,959,757 | 2,624 | 61,038 | ........ | ........ | 9,580,267 | 474,758 |
| 1873 | 1,158,097 | 6,003,618 | ........ | ........ | ........ | ........ | 7,161,715 | 359,566 |

*Cattle.* Baltimore is steadily increasing in importance as a cattle market. It is in close proximity to the rich grazing fields of Virginia and Tennessee; Western stock is confined for a briefer time than when shipped to more northern ports; ample facilities are provided in well equipped stock-yards, and the steamship lines from this port are especially fitted for cattle transportation. The receipts at the Union Stock Yards for 1892 were: Cattle, 100,035; sheep, 283,420; hogs, 546,338. The first shipment of cattle to foreign ports took place in 1878. Since that time the trade has assumed large proportions, its development being indicated by the following figures:

| Year. | Number. | Value. |
|---|---|---|
| 1879 | 2,675 | $ 267,500 |
| 1880 | 10,758 | 949,858 |
| 1881 | 3,372 | 367,445 |
| 1882 | 3,824 | 473,835 |
| 1883 | 16,356 | 1,618,626 |
| 1884 | 15,393 | 1,747,095 |
| 1885 | 18,236 | 2,038,900 |
| 1886 | 12,493 | 1,307,410 |
| 1887 | 16,404 | 1,658,433 |
| 1888 | 23,286 | 1,903,512 |
| 1889 | 59,357 | 5,050,930 |
| 1890 | 90,847 | 7,481,340 |
| 1891 | 66,230 | 5,518,703 |
| 1892, to October 1 | 78,092 | 6,515,758 |
| Total | 417,223 | $36,889,345 |

*Tobacco.* Baltimore has always been the principal market for all tobacco grown in Maryland. But little of this is used for domestic consumption, the bulk being exported to Holland, Germany, France and Northern Europe. Baltimore is also the distributing point for much of the tobacco grown in Eastern Ohio, part of which is consumed in this country, part exported to Europe. Since early provincial days a system of official inspection has prevailed, designed for the protection of seller and purchaser. Three warehouses for this purpose are in operation in Baltimore. The transactions for 1892 are indicated in the following statement:

| | | | |
|---|---|---|---|
| Stock on hand January 1, 1892 | | | 3,788 hhds. |
| INSPECTIONS. | | | |
| Maryland | 24,811 | | |
| Deduct re-inspections | 2,356 | | |
| | | 22,455 | |
| Ohio | 6,520 | | |
| Deduct re-inspections | 461 | | |
| | | 6,059 | |
| Virginia and Kentucky | | 61 | |
| | | | 28,575 |
| | | | 36,458 |

| | | |
|---|---|---|
| Amount brought forward | | 36,458 |
| SHIPMENTS OF MARYLAND AND OHIO TO | | |
| Bremen | 3,804 | |
| Holland | 12,469 | |
| Antwerp | 97 | |
| Hamburg | 797 | |
| England | 50 | |
| France | 12,089 | |
| North of Europe via New York | 87 | |
| Taken for home consumption and by Baltimore manufacturers and re-packers | 2,247 | |
| Shipments of Virginia and Kentucky of Baltimore inspection | 30 | |
| | | 31,670 |
| Stock December 31, 1892 | | 4,788 |

STOCK DIVIDED.

| | Md. | Ohio. | Va., Ky. |
|---|---|---|---|
| First hand | 63 | 203 | .. |
| Shippers | 2,837 | 218 | .. |
| Manufacturers | 482 | 932 | 53 |
| Total | 3,382 | 1,353 | 53 |

*Cotton.* The cotton receipts of Baltimore, though considerable, are hardly of the magnitude to be expected from so favorable a point of export. Local storage and compressing facilities are excellent; ocean freights are cheaper, and higher prices are obtained here than at more southern parts. With the extension and development of southern transportation facilities, it is probable that this trade will undergo marked expansion. The movements for the year ending August 31, 1892, compared with those of the preceding year, are as follows:

| | 1892. | 1891. |
|---|---|---|
| Gross receipts, bales | 386,205 | 281,570 |
| Add stock carried over | 5,500 | 200 |
| Total | 391,705 | 281,770 |

DISTRIBUTION.

| | 1892. | 1891. |
|---|---|---|
| Exported, Great Britain | 128,962 | 78,742 |
| " Continent | 154,678 | 93,374 |
| " France | 7,611 | 13,774 |
| Coastwise and spinners' takings | 89,266 | 90,380 |
| Destroyed by fire | 1,288 | ...... |
| Stock on hand, August 31 | 9,900 | 5,500 |

The chief articles of export in addition to the above are: provisions, copper, oils, lumber, oil cake, seeds and whiskey. The principal items included under the head of provisions are lard, beef (canned and fresh), tallow, bacon and pork. For the fiscal year 1892, these items formed a total amount of 146,996,099 pounds, valued at $11,188,685. Extensive

copper mines and works in Montana and Arizona are controlled by Baltimore interests, and the entire output is marketed in Baltimore. Nearly twenty thousand tons of the matte, valued at $2,713,767, were exported in 1892, in addition to 11,806,294 pounds of ingots, valued at $1,467,288. Among exported oils, petroleum, lubricating and cottonseed are the most important. Olio to the value of $771,646 was sent abroad in 1892. In addition to the enormous quantity of lumber received for local consumption—some seventy million feet in 1892—exports in boards, staves and logs during the year aggregated one and a half million dollars. Oil cake added a value of $1,027,877; timothy and clover seed, $736,031, and whiskey, $512,983.

*Coffee.* For almost a century Baltimore has been a leading centre for the importation and distribution of coffee. The supremacy of the Baltimore clipper led to the early development of the trade, and it has since been maintained by long established firms. For a series of years the volume of imports decreased with the keen competition of other seaboard cities, but the normal tendency has more recently begun to assert itself. During 1892, trade was larger and more profitable than for some years past. The volume of imports aggregated 183,458 bags as against 166,689 in 1891, showing an increase of 16.769 bags. Aside from the benefits arising from intimate acquaintance with the trade, Baltimore possesses certain definite advantages as a favorable point of import. These consist in advantageous location, involving lower rates for interior shipment, ample facilities for receipt and distribution, and extraordinarily low terminal charges. This latter point is especially deserving of emphasis,—careful estimates showing an advantage of nearly fifty per cent. in favor of Baltimore as against other Atlantic seaports.

*Fruit, etc.* A fleet of vessels is engaged in the fruit trade between Baltimore and the West Indies. Pineapples, cocoanut and bananas are largely imported for home consumption and general distribution. In 1892 imports under this head aggregated $607,746, as against $541,077 in 1891. Baltimore is one of the largest manufacturing centres of fertilizers in the country, and hence a heavy importer of chemicals—soda ash, brimstone, muriate of potash, nitrate of soda, etc. The volume of imports is further swelled by iron ore, 421,712 tons (1892); tin plate, 52,004,521 pounds (1892); sugar, 15,599,263 pounds (1892).

The extent of Baltimore commerce is further shown in the following statement of the tonnage movement and number of immigrants landed at the port for the fiscal year ending June 30, 1892:

## TONNAGE MOVEMENT.

| Nationality. | Sail. | | Steam. | | Total. | |
|---|---|---|---|---|---|---|
| | No. | Tons. | No. | Tons. | No. | Tons. |
| American, foreign trade | 166 | 52,638 | 9 | 2,701 | 175 | 55,339 |
| British | 20 | 6,551 | 531 | 846,719 | 551 | 853,270 |
| Danish | ........ | ........ | 1 | 1,198 | 1 | 1,198 |
| Dutch | ........ | ........ | 5 | 10,009 | 5 | 10,009 |
| German | 1 | 271 | 59 | 162,320 | 60 | 162,591 |
| Italian | 13 | *9,248 | 1 | 1,324 | 14 | 10,572 |
| Norwegian | 2 | 1,501 | 44 | 23,829 | 46 | 25,330 |
| Spanish | ........ | ........ | 3 | 5,059 | 3 | 5,059 |
| Total for 1892 | 202 | 70,209 | 653 | 1,053,159 | 855 | *1,123,368 |
| " 1891 | 203 | 78,994 | 414 | 627,761 | 617 | 706,755 |
| Entered coastwise 1892 | ........ | ........ | ........ | ........ | 1,153 | 1,192,137 |
| " " 1891 | ........ | ........ | ........ | ........ | 1,215 | 1,150,882 |

*59 per cent. increase.

## CLEARED.

| Nationality. | Sail. | | Steam. | | Total. | |
|---|---|---|---|---|---|---|
| | No. of Vessels. | Tons. | No. of Vessels. | Tons. | No. of Vessels. | Tons. |
| American, foreign trade | 147 | 51,817 | 7 | 714 | 154 | 52,531 |
| British | 18 | 6,205 | 627 | 1,004,474 | 645 | 1,010,679 |
| Danish | ........ | ........ | 1 | 1,198 | 1 | 1,198 |
| Dutch | ........ | ........ | 23 | 44,521 | 23 | 44,521 |
| German | 1 | 271 | 97 | 239,052 | 98 | 239,323 |
| Italian | 2 | 1,121 | ........ | ........ | 2 | 1,121 |
| Norwegian | 3 | 2,021 | 44 | 24,324 | 47 | 26,345 |
| Spanish | ........ | ........ | 5 | 8,217 | 5 | 8,217 |
| Total for 1892 | 171 | 61,435 | 804 | 1,322,500 | 975 | *1,383,935 |
| " 1891 | 185 | 55,677 | 523 | 849,538 | 708 | 905,215 |
| Cleared coastwise 1892 | ........ | ........ | ........ | ........ | 1,909 | 1,524,602 |
| " " 1891 | ........ | ........ | ........ | ........ | 1,930 | 1,501,158 |

*53 per cent. increase.

IMMIGRATION.

| Nationality. | Male. | Female. | Total. |
|---|---|---|---|
| Argentine Republic | 1 | 2 | 3 |
| Austria | 2,922 | 1,486 | 4,408 |
| Belgium | 3 | 1 | 4 |
| Bohemia | 1,101 | 1,021 | 2,122 |
| British West Indies | 7 | 5 | 12 |
| Denmark | 164 | 113 | 277 |
| England | 187 | 125 | 312 |
| France | 13 | 11 | 24 |
| Germany | 17,080 | 16,667 | 33,747 |
| Hungary | 1,864 | 734 | 2,598 |
| Ireland | 51 | 66 | 117 |
| Italy | 2 | ......... | 2 |
| Netherlands | 60 | 47 | 107 |
| Norway | 25 | 19 | 44 |
| Poland | 517 | 153 | 670 |
| Portugal | 2 | ......... | 2 |
| Roumania | 10 | 6 | 16 |
| Russia | 6,644 | 4,366 | 11,010 |
| Scotland | 5 | 2 | 7 |
| Sweden | 172 | 131 | 303 |
| Switzerland | 11 | 15 | 26 |
| Turkey in Europe | 4 | 8 | 12 |
| Totals | 30,845 | 24,978 | 55,823 |
| Passengers not immigrants | ......... | ......... | 1,500 |
| Grand total, 1892 | ......... | ......... | 57,323 |
| Grand total, 1891 | ......... | ......... | 42,004 |

## CUMBERLAND.

Some idea of the causes of Cumberland's immense trade, and advantages as a distributive point, may be better comprehended after a brief description of its railroads and the country through which they form channels for the outlet of the products of the farm, forest and mines. For what may be known as local distribution, it has several distinct roads. The Cumberland and Pennsylvania Railroad with its branches runs up through the mining region, and taps the towns of Eckhart, Mt. Savage, Frostburg, Lonaconing and Piedmont, whose aggregate population is over 15,000 souls, all living within twenty-eight miles of Cumberland. The George's Creek and Cumberland Railroad reaches Lonaconing by another route. The Piedmont and Cumberland, an extension of the West Virginia Central and Pittsburg, parallels the Baltimore and Ohio through one of the most fertile of Allegany county's agricultural districts, and at Piedmont connects with the parent line. This opens up for one hundred and twenty-two miles the vast timber lands and gas coal regions of West Virginia. For the shipment of merchandise and coal to the large eastern and western markets, there are the main stem of the Baltimore and Ohio, the Pittsburg and Connellsville, and the Pennsylvania Railroads, which last road obtains an entrance to the city over the tracks of the State line branch of the George's Creek and Cumberland

Road. Added to this, the Chesapeake and Ohio Canal, which has its western terminus in this city, affords direct connection with tidewater at Georgetown, D. C.

With all these facilities the expeditious handling of freight is, comparatively speaking, an easy matter. With Cumberland as an entrepot, immense quantities of merchandise are received and distributed over the different lines mentioned. The express business for the months of October, November and December of 1892 shows over a million and a half of pounds received and forwarded. The United States Express Company handled 733,457, the Adams Express Company 437,976, and the Cumberland and Pennsylvania Express Company 532,000 pounds.

The freight handled, exclusive of coal, for the same period by the Baltimore and Ohio Railroad amounted to 135,195,708 pounds; that handled by the Cumberland and Pennsylvania was 53,420,000 pounds; by the West Virginia Central, over the Piedmont and Cumberland, 92,703,436 pounds; by the Pennsylvania Railroad, to and from Cumberland, 68,435,433 pounds. To recapitulate, the tonnage of the express and freight business done in Cumberland during the months of October, November and December of 1892 was as follows:

| | |
|---|---|
| United States Express | 736,457 |
| Adams | 437,978 |
| C. & P. | 532,000 |
| Total | 1,706,433 |

The freight handled, exclusive of coal, for the same period, was—

| | |
|---|---|
| Baltimore and Ohio | 138,271,094 |
| Cumberland and Pennsylvania | 53,420,000 |
| West Virginia Central | 92,703,436 |
| Pennsylvania Railroad | 68,435,433 |
| Total | 352,829,963 |
| Total pounds of express matter | 1,706,433 |
| Total pounds of freight matter | 352,829,963 |
| Grand total | 354,536,396 |

From the trade for the last three months of 1892, some conception of the annual business carried on may be formed. This tonnage, it must be remembered, is wholly made up of merchandise; coal, the most important article of distribution, does not enter into it at all. The statistics of the Cumberland coal trade, which are published annually, report an output from the twenty-nine companies engaged in mining, of over four millions of tons for 1892, and the employment of every railroad entering Cumberland in their removal to the seaboard.

The number of tons mined, and the tonnage delivered by the different railroads to Cumberland, and there distributed, was as follows:

| FROM— | To B.&O.R.R. | C.&O.Can. | Penna.R.R. | Local. | Total. |
|---|---|---|---|---|---|
| Cumberland & Pennsylvania R. R.... | 1,343,965 | 96,705 | 214,011 | 83,069 | 1,734,710 |
| Eckhart Branch R. R.................. | 312,459 | 170,116 | ........ | 36,755 | 519,328 |
| George's Creek & Cumberland R. R... | 206,112 | ...... | 566,006 | 26,202 | 804,317 |
| West Virginia Central Railway....... | 345,987 | 3,080 | 423,472 | 198,675 | 971,214 |
| | 2,210,456 | 266,901 | 1,205,486 | 346,721 | 4,029,564 |

The successful handling and disposition of this vast amount of freight places Cumberland in the front rank of cities of its size as an admirable distributive point.

The West Virginia Central Railway is about to build an extension from Cumberland to Hagerstown, at which point it will connect with the Western Maryland Railroad, and will afford Cumberland another artery of commerce. Surveys have been made for another road to reach the rich agricultural communities or upper villages of the South Branch, and an extension of the electric railway of Cumberland through the entire mining portion of the county is also among near possibilities, a company having already been chartered and organized for this purpose.

### HAGERSTOWN.

Any consideration of the trade and commerce of Hagerstown involves in large measure the trade of Washington county, of which it is the geographic as well as business centre. Before the construction and development of railroad systems, in the days of the "Conestoga Wagon" with its "bell team," wheat, the staple product of the county, was ground in local mills. For many years the county stood well in the lead in production of this cereal, and its numerous available streams placed ample mill power within easy reach of every section. The county seat being the banking centre, farmer and miller went there for the purchase and sale of the commodity, and the National road was the highway to market. The early development of a fine system of macadamized roads, radiating hence to every section of the country and affording easy transportation, in winter especially, tended still further to such concentration. When the railway development came, natural conditions led to the same centering and radiation, so that now there is no village or point within the county more than three or four miles distant from a railroad station.

The Cumberland Valley Railroad, running from Harrisburg, Pennsylvania, to Winchester, Virginia, crosses the whole width of the State here, a distance of twelve miles, and brings into close connection the whole of the Pennsylvania system. The Shenandoah division of the Norfolk and Western, beginning here, extends to Roanoke, Virginia, and

The number of tons mined, and the tonnage delivered by the different railroads to Cumberland, and there distributed, was as follows:

| FROM— | To B.&O.R.R. | C.&O.Can. | Penna.R.R. | Local. | Total. |
|---|---|---|---|---|---|
| Cumberland & Pennsylvania R. R.... | 1,343,905 | 93,705 | 214,011 | 83,089 | 1,734,710 |
| Eckhart Branch R. R................. | 312,452 | 170,116 | ........ | 36,755 | 519,323 |
| George's Creek & Cumberland R. R... | 208,112 | ...... | 568,003 | 28,202 | 804,317 |
| West Virginia Central Railway....... | 345,987 | 3,080 | 423,472 | 198,675 | 971,214 |
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by its local connection with the Cumberland Valley, puts the city upon the great inside highway from New York to New Orleans and Memphis in the southwest, and to all Florida points in the southeast. A road is now being constructed from here to Cumberland which will connect, at this point, the Cumberland Valley and the West Virginia Central, thus making a direct route to the seaboard for the immense coal and timber products of West Virginia. The Washington County branch of the Baltimore and Ohio, running southward twenty-four miles through the county, connects it closely with that great thoroughfare.

The Western Maryland, striking the county at its northeast corner, traverses the greater part of its extent westward to its connection at Cherry Run, West Virginia, with the main line of the Baltimore and Ohio. It touches the Potomac at Williamsport, and by its branch from the mountain foot at Edgemont, thence to Shippensburg, Pennsylvania, connects with the Reading road, thus giving the advantage of close association with that extended system. There is thus secured to every smaller town, and to every section of the county, direct and frequent access to Hagerstown, and her distributive trade finds actual and active competition for transportation to every quarter, north, south, east and west. With twenty-eight passenger and express trains daily each way, it is not surprising that a large traffic has been developed in dairy products, fruit and poultry, for the markets of New York, Philadelphia, Baltimore, Washington and Pittsburg are all within less than twelve hours from the city.

Another phase of development, not immediately connected with Hagerstown, yet in part the outcome of its business enterprise and capital, and in large measure under the control of its citizens, is the peach industry. Along the slopes and foot hills of the mountains on either side, thousands of acres are now planted in peaches, and growing yearly in value. The crop of 1892, under the very adverse conditions attending it, exceeded a half million bushels, the whole of which was marketed in the eastern markets to private consumers, and not for canning, the quality being to growers of far greater moment than quantity. Under fair conditions it is expected that the crop of this year will greatly exceed a million bushels. As further indicating somewhat of the character and amount of its trade, may be noted these facts: The wholesale grocery and notion trade, reaching from Baltimore to Wheeling, from Harrisburg to Roanoke, amounts annually to over $1,000,000; the sale and shipment of beef, cattle, sheep and hogs, exceeds $600,000; of horses, $250,000; of hay, $100,000; of hardwoods, cut and in bulk, all exported, $175,000. Retail trade is represented in part by the annual sales of dry goods, $400,000; clothing, ready made, $150,000; custom made, a like amount; shoes and hats, $200,000; groceries, $500,000;

leather and its products, $75,000; hardware, $150,000; agricultural implements, a large part of which, steam engines, threshers, clover hullers, etc., are made here, $150,000; fertilizers, $125,000; confectionery, $100,000.

In the march of improvement the latest mill machinery has been introduced, and the manufacture and shipment of flour has also in large part centered here. From the four large roller mills and elevators in or controlled from the city, there is shipped as flour the product of about 300,000 bushels of wheat annually; the shipments of corn aggregate 100,000 bushels more. A large part, however, of the corn grown in the county is used in fattening cattle during the fall and winter, all being shipped from this point to Eastern markets, whence a part is exported directly to Liverpool.

## THE EASTERN SHORE.

The Peninsula, comprising the Eastern Shores of Maryland and Virginia, and the State of Delaware, is about one hundred and seventy miles in length from north to south, and about sixty-five miles in width from east to west at its widest part. It is bounded on the east by the Delaware River and Bay, and the Atlantic Ocean, and on the south and west by the Chesapeake Bay. It is so penetrated on all sides by numerous navigable rivers, creeks and inlets, that it has been said that there are few farms, towns, or dwellings on the Eastern Shore of Maryland more than five miles from navigable water. This fact, with the smooth level roads, renders the matter of transportation by water a simple question. At the same time the absence of mountains and high hills, and the rarity of stone and rock, render the construction of railroads inexpensive. The railroads of the peninsula are, with two exceptions, so closely connected in organization, that no intelligible account of the railroads on the Eastern Shore of Maryland is possible without reference to those of Delaware and the Eastern Shore of Virginia.

The Peninsula is traversed from north to south by a line of railroad, a part of which is controlled by the Pennsylvania Railroad system. The Delaware Division of the Pennsylvania Railroad begins near Wilmington, Delaware, and runs through the State of Delaware, nearly parallel with the Maryland line, to Delmar (ninety-five miles). From this point the New York, Philadelphia and Norfolk Road runs through Maryland and Virginia to Cape Charles City, a distance of ninety-five miles (thirty-seven miles in Maryland). At Cape Charles City, connection is made by ferry with Norfolk, (twenty miles). These two roads make a continuous first-class road running from the extreme north to the extreme south of the Peninsula; and through trains make the run from Cape Charles City to Philadelphia in six and a half hours.

These roads are practically operated as a part of the Pennsylvania system. Connected with them, are a number of smaller tributary roads, also owned or controlled and operated by the Pennsylvania Railroad. Beginning on the Chesapeake side and with the most northerly, the Queen Anne and Kent Railroad runs from Centreville, the county town of Queen Anne's county, northeasterly through Queen Anne's and Kent counties to Massey's (twenty-five miles), connecting at that point with the Baltimore and Delaware Bay Railroad, and also with a branch of the Delaware Division, Pennsylvania Railroad, running from Townsend, in Delaware, to Massey's (nine miles). The Delaware and Chesapeake Railroad begins at Oxford, in Talbot county, and runs northeasterly through Talbot and Caroline counties to Clayton, Delaware (fifty-four miles, of which forty are in Maryland). The Cambridge and Seaford Road, running from Cambridge, in Dorchester county, northeasterly to Seaford, Delaware (twenty-seven miles, about twenty-two miles in Maryland), connecting at Seaford with the Delaware Division. The Crisfield Branch of the New York, Philadelphia and Norfolk Railroad begins at Crisfield, in Wicomico county, runs northeast to Peninsula Junction (seventeen miles) in the same county, connecting at that point with the New York, Philadelphia and Norfolk Railroad. On the Atlantic side, the Delaware, Maryland and Virginia Road begins at Franklin City, on Chincoteague Sound, in Virginia, near the Maryland line, and runs northerly, parallel with the Atlantic, to the Maryland line, and through Delaware, connecting with the Delaware Division at Harrington (seventy-eight miles, thirty-five miles in Maryland). These roads furnish excellent facilities for the transportation of freight and passengers to Philadelphia and points on the Pennsylvania system, all of them having two trains daily each way.

The Peninsula is traversed from east to west by the Baltimore and Delaware Bay Railroad, as yet unfinished. It begins at Bombay Hook on the Delaware Bay, at which point it connects with the New Jersey Central by ferry, and runs in a westerly direction, crossing and connecting with the Delaware Division at Clayton, and when finished will extend to Rock Hall, in Kent county, Maryland. It has been finished from Bombay Hook to Chestertown (forty-two miles), with a branch to Nicholson (nine miles—thirty-three miles in Maryland). It has been graded to within about four miles of Rock Hall, and will probably be finished in the course of this year. Rock Hall is immediately opposite the Patapsco river, and the nearest harbor on the Eastern Shore to Baltimore. From this point connection will be made by ferry with Baltimore (about eighteen miles). At present the road is operated from Clayton to Chestertown only. It is owned by parties interested in the New Jersey Central Railroad.

The Baltimore and Eastern Shore Railroad begins at Ocean City, a summer resort on the Atlantic coast, and runs northwesterly through Maryland to Claiborne, on Eastern Bay, a tributary of the Chesapeake (eighty-seven miles). From this point connection is made by boat with Baltimore (forty-two miles). This road is in the hands of a receiver, but is now in process of reorganization. The plan of reorganization includes the extension of the road from Easton, north through Talbot and Queen Anne's county, and Kent county to Centreville, Chestertown and Rock Hall, connecting at that point by ferry with Baltimore.

The number of manufactures or industrial enterprises on the Eastern Shore is limited. The people are engaged chiefly in farming, fishing and oystering. The country is naturally very fertile. It is level or rolling, has no large hills and no stone, and it is easily cultivated. Its agricultural products are chiefly wheat, corn and the other cereals and fruit. Large quantities of peaches, pears and other fruit are raised. Though possessing exceptional facilities for the raising of stock, this industry does not exist to any great extent. Attention has recently been called to the advantages of the Eastern Shore as a health resort, and there is already some travel to the locality for this reason. The freight carried by the roads consists, in addition to passenger business, of products of the farms and water. Large quantities of grain, fruit, oysters, fish and game are shipped to the North and West over these railroads, the return freight being chiefly coal, lumber and the usual requirements of a farming and fishing population.

# CHAPTER X.

## MANUFACTURES.

The history of colonial Maryland is essentially that of an agricultural community. Throughout the seventeenth and far into the eighteenth centuries "tobacco is king." It not only dominated all economic activities, but even entered into the details of social and political life. The commercial policy of England fostered its cultivation, as tending to preserve in her possessions an exclusive market for British manufactures. This fact, aided somewhat later by actual measures of repression, served to prevent any general industrial activity in provincial Maryland. Yet the natural advantages of mineral wealth and motive power could not be entirely suppressed. Iron-works were opened along the Patapsco river as early as 1715, and the regular exportation of pig-iron began in 1717. Thrifty German settlers, a little later, introduced the beginnings of wool and flax spinning, and the manufacture of linen and woolen goods. Numerous flour mills were attracted by the excellent sites along Jones' Falls, Gwynn's Falls and the Patapsco river, and this industry more perhaps than any other single cause, contributed to the early growth of Baltimore.

In 1769 a non-importation association was organized, and extended throughout the province. The discredit thus thrown upon the whole line of British manufactures, culminated five years later in a system of practical non-intercourse with Great Britain, and for a term of years the colonists were thrown largely upon their own resources. Varied branches of manufacture sprang up, and the province tended rapidly to become self-supporting. In 1778 we find in active operation linen, woolen, card and nail factories, paper and slitting mills and bleach-yards. The first sugar refinery was established in Baltimore in 1784, and five years later the manufacture of glass was introduced. A considerable number of flour mills, iron furnaces, cotton mills and tanneries were in successful operation in different parts of the State.

The industrial development of Maryland during the next half century is gradual, but substantial. Commerce and shipping, rather than manufactures, engage general attention; yet Baltimore steadily becomes a

leading centre for sugar refining, cotton duck manufacture, flour milling and metal production. In other directions progress is less marked, but everywhere the substructure is laid for the activity of later times. The new era may be said to have begun with the industrial revival following the close of the late war, and has ever since proceeded with rapid strides and over a widening area.

In industrial opportunity Baltimore is unsurpassed among American cities, and younger centres invite development in every section of the State. Geographical position and railroad connection afford special opportunities in the procurement of raw materials and the distribution of products. Interior situation confers great advantages upon the harbors of the State as favorable ports of entry. Healthful climate, cheap living, low rents, skilled labor, tax exemptions, favored sites, water frontage, motive power, are among the special attractions that invite manufacturing industries of all kinds.

## BALTIMORE.

In these days of forced urban development, it is common for every new manufacturing town to claim extraordinary advantages as an industrial centre. Far-sighted men, however, recognize that the struggle for existence is nowhere fought out more relentlessly than in the commercial world; and that those cities which have attained industrial prominence by slow development and by force of natural advantages are far more inviting, other things being equal, than those which have been forced into temporary importance by artificial methods.

### INDUSTRIAL ADVANTAGES.

The advantages which Baltimore offers as a manufacturing centre consist in natural location, in peculiar economic conditions, and in the liberal policy of its municipal administration. Reference has already been made to the advantages conferred by favored geographical situation and the establishment of direct lines of communication. In the case of Baltimore, closer proximity by several hundred miles to the great cotton belt of the South, to the grain-growing sections of the West, and to the wood, coal and iron wealth of the interior, affords cheap and easy access to the supplies required for industries of every kind. The labor supply is steady and efficient. As compared with New York and Philadelphia or Boston, skilled mechanics receive from twenty-five cents to one dollar a day less in building and iron industries, and seventy-five cents to one dollar and a-half less as compared with Chicago, St. Louis and Minneapolis. Unskilled labor is available at from one dollar to one dollar and a-half per day. This difference in labor cost does not involve lower efficiency or poorer living. In no other city of similar size in the

country are the laboring classes better off. The proximity of a rich and productive country, the cheapness of water transportation, and the economy of domestic distribution through public markets, combine to render the cost of living in Baltimore less than in cities of much smaller size. The cheapness of house rents in Baltimore is notorious. Neat and comfortable dwellings in respectable neighborhoods may be rented at fifteen and eighteen dollars a month, and houses in more favored sections with many conveniences can be had for twenty-five dollars a month. Handsome dwellings, desirably located and fitted with all modern appointments, may be rented for forty dollars a month. The supply of water available for manufacturing purposes is unlimited and furnished at a nominal rate. Desirable manufacturing sites can be obtained with or without water frontage, and plants as erected are exempted by special ordinance from municipal taxation.

### INDUSTRIES.

The manufacturing interests of Baltimore include almost every important industry. The city is the largest manufacturing centre in the United States of ready-made clothing, oyster canning and fruit packing, shirts and overalls, fertilizers, straw goods and cotton duck, while its operations in other directions are absolutely even of greater magnitude. The statistics of important industries as returned by the Eleventh Census are as follows:

I.*

| Industries. | Number of establishments. | Capital Employed. | Wages Paid. | Average number of Hands Employed | Materials used. | Miscellaneous Expenses. | Goods Manufactured. |
|---|---|---|---|---|---|---|---|
| Brass Casting | 7 | $ 1,689,428 | $ 663,056 | 1,187 | $ 785,852 | $ 30,745 | $ 1,903,850 |
| Clothing | 125 | 11,897,563 | 4,178,971 | 13,094 | 8,120,981 | 408,258 | 15,032,924 |
| Fertilizers | 25 | 4,163,347 | 399,741 | 638 | 2,566,577 | 197,316 | 3,957,345 |
| Iron Foundries | 65 | 5,041,767 | 1,837,450 | 3,436 | 1,789,085 | 235,833 | 4,718,189 |
| Oyster and Fruit Canning | 40 | 3,226,416 | 1,886,851 | 8,990 | 5,369,261 | 141,023 | 8,516,799 |
| Liquors, distilled | 5 | 1,421,225 | 94,824 | 146 | 683,861 | 1,029,220 | 2,085,560 |
| Liquors, malt | 27 | 4,924,988 | 532,739 | 690 | 1,508,482 | 963,062 | 3,825,174 |
| Drugs and Medicines | 20 | 975,725 | 246,028 | 698 | 779,251 | 290,599 | 1,947,950 |
| Slaughtering and Meat Packing | 14 | 1,153,856 | 225,112 | 421 | 3,668,147 | 75,232 | 4,311,412 |
| Tobacco | 350 | 4,208,451 | 1,240,093 | 3,242 | 2,522,336 | 1,260,387 | 5,906,333 |

PERCENTAGES OF INCREASE.

| | |
|---|---|
| Number of establishments reported | 35.22 |
| Capital invested | 104.63 |
| Number of hands employed | 40.39 |
| Wages paid | 121.83 |
| Cost of materials used | 44.27 |
| Value of product at work | 69.19 |

*Compiled from Census Bulletin, No. 269.

**The following additional statistics are published through the courtesy of Superintendent Robert P. Porter, of the Census Office. They are preliminary in character, and subject to revision and correction before final publication:**

II.

| INDUSTRIES. | Number of establishments. | Capital. (a) | Miscellaneous Expenses. | Average number of Hands. | Wages. | Cost of Materials. | Value of Products. |
|---|---|---|---|---|---|---|---|
| Boots and shoes(b) | 49 | $ 938,514 | $ 38,605 | $ 1,834 | $ 671,066 | $ 808,888 | $ 1,711,867 |
| Brick and tile | 36 | 1,941,069 | 187,786 | 1,630 | 547,067 | 146,407 | 1,055,506 |
| Confectionery | 98 | 906,474 | 96,532 | 854 | 278,032 | 1,196,219 | 1,861,599 |
| Clay and pottery products | 10 | 492,967 | 8,604 | 617 | 261,713 | 116,010 | 500,625 |
| Flouring and grist mills | 11 | 1,006,048 | 158,609 | 240 | 172,548 | 2,775,120 | 3,285,721 |
| Furniture(c) | 26 | 1,222,444 | 76,098 | 1,371 | 647,786 | 1,031,785 | 2,056,419 |
| Hats & caps, not including wool hats | 18 | 724,457 | [illegible] | 843 | 305,079 | 607,580 | 1,261,523 |
| Leather, tanned and curried | 12 | 203,788 | 11,586 | 205 | 90,185 | 335,798 | 455,618 |
| Lumber(j) | 31 | 1,789,101 | 121,118 | 1,243 | 753,976 | 1,819,479 | 3,105,288 |
| Millinery and lace goods | 6 | 59,075 | 5,462 | 167 | 53,098 | 68,940 | 155,500 |
| Paints and oils(d) | 12 | 469,857 | 17,944 | 117 | 64,752 | 200,041 | 344,230 |
| Pianos(e) | 4 | 1,063,987 | 128,460 | 737 | 583,160 | 406,593 | 1,291,165 |
| Musical instruments(k) | 11 | 32,243 | 3,596 | 50 | 33,979 | 26,948 | 81,961 |
| Printing and publishing(f) | 127 | 1,696,184 | 386,489 | 1,803 | 1,117,208 | 729,848 | 2,896,356 |
| Shirts, factory products | 18 | 418,400 | 44,225 | 1,311 | 345,407 | 596,993 | 1,191,918 |
| Shipbuilding | 19 | 1,256,422 | 91,343 | 975 | 610,410 | [illegible] | 1,640,317 |
| Steel(g) | 11 | 648,906 | 30,596 | 330 | 156,104 | 478,271 | 749,207 |
| Marble and stone work(h) | 55 | 1,164,457 | 169,892 | 731 | 461,805 | 644,541 | 1,571,945 |
| Lithographing and engraving | 4 | 183,800 | 22,810 | 197 | 125,766 | 98,331 | 316,352 |

**(a) Does not include the value of hired property.**

**(b) Includes returns classified by the Census Office, as "boots and shoe uppers" and "boots and shoes, factory product."**

(c) Includes returns classified by the Census Office, as "furniture, chairs," and "furniture, factory product."

(d) Includes returns classified by the Census Office, as "paints," and "oil, lubricating."

(e) Includes returns classified by the Census Office, as "musical instruments, pianos and materials."

(f) Includes returns classified by the Census Office, as "printing and publishing, book and job," and "printing and publishing, newspapers."

(g) Includes returns classified by the Census Office, as "iron and steel;" "iron and steel, architectural;" "iron and steel, bolts;" "iron and steel, nails and spikes."

(h) Includes returns classified by the Census Office, as "marble and stone work" and "monuments and tomb stones."

(j) Includes returns classified by the Census Office, as "lumber, planing mill products," "lumber from logs or bolts."

(k) Includes returns classified by the Census Office," as "musical instruments and materials not specified" and "musical instruments, organs and materials."

*Banking.* The industrial development of any city is largely dependent upon the character and operations of its financial institutions. Baltimore banks are thoroughly in accordance with the growth and progress of the city and offer abundant facilities for mercantile transactions. The aggregate loans and discounts of the several national banks have increased nearly one hundred per cent. within a period of twenty years. The operations of State banks, banking and trust companies, contribute to make the result even more remarkable; and the wisdom and fidelity with which these institutions are managed is shown by the

fact that no chartered bank has failed in Baltimore within a period of sixty years. The development and resources of these institutions is indicated in the following statement of the operations of the national banks of Baltimore and of the increase in bank clearances within a term of years:

| | Number. | Capital. | Surplus. | Loans and Discounts. | Deposits. |
|---|---|---|---|---|---|
| 1870 | 13 | $10,891,985 00 | $2,679,883 57 | $17,069,159 92 | $13,215,291 03 |
| 1880 | 15 | 10,890,130 00 | 3,316,851 43 | 23,808,488 16 | 20,884,184 47 |
| 1890 | 19 | 12,313,260 00 | 4,975,346 75 | 31,727,650 32 | 29,748,822 45 |
| 1892 | 22 | 13,243,312 00 | 5,374,626 69 | 31,964,550 51 | 28,174,838 45 |

BANK CLEARANCES.

| | | | |
|---|---|---|---|
| 1886 | $616,303,898 35 | 1890 | $753,095,193 24 |
| 1887 | 659,346,471 55 | 1891 | 735,714,652 00 |
| 1888 | 620,587,729 65 | 1892 | 769,355,890 00 |
| 1889 | 650,583,571 15 | | |

*Clothing.* The industrial development of Baltimore is exemplified in the growth of its clothing manufactures. Beginning some forty years ago, the trade assumed large proportions for a period, then suffered severely from the loss of southern and western business during the war, and finally entered upon a course of growth and expansion that has continued uninterrupted to the present day. The census of 1890 returned one hundred and twenty-five establishments engaged in wholesale manufacture, at least forty of which are organized for production upon a large scale. The products vary in character from the highest grades of merchant clothing, to the cheapest and plainest wares. Distribution is general, though the chief makets are in the south and southwest.

*Canned Goods.* All the world over Baltimore is famed as a great centre for the canning of oysters and the packing and preserving of vegetables and fruits. Some of the largest establishments in the country are located here and Baltimore brands command a wide market. The local oyster pack in 1892 aggregated five and one-half million bushels, although as a result of superior distributive facilities, almost the entire product of Chesapeake Bay is marketed here. Crisfield, Cambridge, Oxford, St. Michael's and Annapolis follow Baltimore in about the order named, as important oyster canning centres. During the summer months most of the canning establishments engage in vegetable and fruit packing. Immense quantities of corn, tomatoes and green peas, drawn largely from adjacent counties and the Eastern Shore, are so consumed. berries, peaches and pine-apples, of which more than a half million dozen were imported in 1892, form the favorite fruits. Distribution, as

before stated, is very general, reaching throughout this country, and into every quarter of the globe. The packing industry has also made Baltimore an important centre for the manufacture of tin cans, about fifty million pieces being annually produced.

*Tobacco.* The proximity to Virginia, North Carolina and the great tobacco regions of the country, together with a large domestic production, has made Baltimore a leading centre for manufactured tobacco. In smoking tobacco, its production exceeds that of any other city in the United States, and it is a large producer of cigars and cigarettes. Distribution is largely in the Western and Northwestern states, and throughout the South. The extent of the industry is shown in the following statistics for the year ending December, 1892:

| | |
|---|---|
| Number of Cigar Factories in district | 808 |
| " Tobacco Factories in district | 24 |
| " Snuff Factories in district | 6 |
| " Pounds of Tobacco manufactured | 9,872,270 |
| " " Snuff manufactured | 1,759,848 |
| " " Fine Cut manufactured | 582,641 |
| " " Leaf worked for cigars | 2,072,270 |
| " " Leaf worked for Cigarettes | 158,828 |
| " Cigars manufactured | 109,046,916 |
| " Cigarettes manufactured | 31,742,976 |
| " Pounds of Sumatra Leaf imported at the rate of $2.00 per pound | 61,406 |
| " Pounds Havana Leaf imported at the rate of 85 cents per pound | 249,368 |
| " Pounds Leaf Tobacco exported | 54,306,880 |
| " " Stems Tobacco exported | 10,068,634 |

*Iron Foundries.* Under the head of foundries and machine shops are classed a large number of extensive establishments engaged in the manufacture of structural iron, heating apparatus, machine tools, stoves, elevators, guns, power-transmission machinery, steam engines and safes. The operations of these firms extend over a wide territory, and their products enjoy a high reputation. One firm makes a specialty of heating apparatus and gas works, and has erected wholly or in part, gas plants in New York, Chicago, Brooklyn, St. Paul, Norfolk, Rochester, as well as in Cuba and South America. A second is extensively engaged in the manufacture of special machinery, and possesses unusual facilities for the manufacture of machine-moulded gearing. A third devotes particular attention to elevators and hoisting machinery, and a fourth to safes and vaults. Many other firms are engaged in the general manufacture of ornamental and other iron work for architectural purposes, and in the preparation of special machinery. Baltimore has been the pioneer in the manufacture of the loom for weaving cotton duck, to which her reputation for the superiority of cotton products is largely due. Other

important forms of machinery have been devised and developed here, notably the linotype machine.

*Fertilizers.* Baltimore is in advance of all American cities in the manufacture of fertilizers. In 1832 the first guano was imported from Peru for local use; soon after the manufacture of a fertilizer from crushed bone was begun, the product being sold to farmers of the adjacent counties. Maryland furnishes a great amount of burnt lime for agricultural purposes; its soil also contains large deposits of marl. But most of the raw materials used in this manufacture come from external sources. The phosphate rock from South Carolina is the most important source of phosphoric acid. The necessary nitrogen or ammonia is derived from tankage, ground-crackling and similar refuse from the great slaughter houses of the West, other sources being bones, fish scraps and bone black. Large quantities of natural guano are brought to Baltimore from the great deposits at Navassa Island. The potash used in fertilizers is obtained almost entirely from Europe, its most important source being the mineral kainite, largely imported from Germany.

*Ship-Building.* In the earlier years of the century Baltimore was renowned for her ship-yards, and "Baltimore clippers" were famed all over the world. As the sailing vessels were replaced to a great extent by steamers, iron taking the place of wood in the construction, this industry for a while declined; but she is now rapidly regaining her position as a ship-building centre. During the past year, sixty-one vessels of an aggregate net tonnage of 17,277 tons were launched from local ship-yards. The largest establishment is located on a tract of land adjoining Fort McHenry. The two steam ferry boats, *Robert Garrett* and *Erastus Wiman*, plying between New York and Staten Island, and the new ice boat *Annapolis* represent the work of this establishment. The United States gunboat *Petrel* was turned out in 1889, and in the following year the oil-tank steamer *Maverick* was completed, the first vessel of the kind built on this side of the Atlantic. The United States cruisers *Detroit* and *Montgomery* are the most important products of the establishment. The activity of the Marine Department of the Maryland Steel Company is described in another place. A number of other ship-yards for construction and repair work are in successful operation.

*Flour Mills.* Baltimore flour mills are among the most productive on the Atlantic seaboard. Six large mills are in operation, two of which are in the city, and four in suburban towns. Although some of these date from almost the foundation of Baltimore, the modern process of crushing and sifting, known as the roller system, has been introduced, and flour of the highest grade is turned out. The local supply of wheat is drawn from Maryland, Virginia, West Virginia, Pennsylvania and

Delaware, and the output is used for home consumption, for export to Brazil and the West Indies, and for distribution throughout the South. The mills combined have a daily capacity of nearly three thousand barrels. Baltimore enjoys peculiar advantages as a milling centre. Not only is Maryland and Virginia wheat rich in all properties necessary for producing flour of the highest grade, but the immense volume of grain poured in from the West permits the choice of the finest varieties from every wheat-growing State.

*Liquors.* A number of breweries are in active operation, which not only provide for the home consumption, but supply a wide external market. Baltimore beer may now be found in all sections of the country, and it is estimated that the trade is increasing at the rate of about ten per cent. per annum. The flourishing condition of the industry, and the possibility of its further extension, have in the last few years attracted foreign capital, and large investments have been made. Several entirely new plants of model design and equipment have been recently erected. A number of distilleries are also operated, the product selling largely in the South and the Southwest, as well as at home; and this industry has considerably increased in the last few years.

*Lumber.* Railroads and steamship lines bring annually to Baltimore large quantities of woods from the West and South; hard woods and white pines from West Virginia, Wisconsin, Michigan, Arkansas, Indiana and Ohio; yellow pine from Tennessee, North Carolina, Georgia and Pennsylvania. The total receipts for local consumption aggregated in 1892 about ninety million feet. The value of timber exported during the fiscal year 1891–1892 was $1,467,970. Some twenty-five wholesale and thirty retail dealers are engaged in the trade, together with fifteen manufacturers of packing boxes, and eleven planing mills, sash, door and blind factories. The activity of all these establishments has been stimulated by the great increase in building during the past few years. The larger manufacturers and wholesale dealers control independent mills in the South and West, from which direct shipments are made.

*Furniture.* Every conceivable variety of furniture, from the simplest office-fixture to the most elaborate drawing-room equipment, is manufactured in Baltimore. The expansion of this industry is due partly to the natural location of the city and the cheapness of raw materials, partly to the efficiency of the labor supply. Large quantities of oak, maple, walnut, poplar, pine, ash, cherry, rosewood and mahogany are annually consumed. These supplies are drawn from the West, and to an increasing extent from the South. Distribution takes place over a wide area. Of the middling and cheaper grades, the South takes the largest quantity, while the higher grades are sent to every part of the country. The home demand for expensive goods in mahogany and rosewood forms a

considerable item, while the remaining proportion of hardwoods is consumed largely in the adjacent States.

*Drugs.* In this line of business Baltimore is the leading market of the South, both for manufacture and distribution. Raw chemicals, such as muriatic, nitric and sulphuric acids, sulphate of ammonia, saltpetre and bichromate of potash, are extensively produced. A great part of the output is used in the home market in the manufacture of fertilizers and drugs; the remainder is taken by the Southern and Middle States. A large market has also been created for patent or proprietary medicines of local manufacture.

*Brass Casting.* Brass founding and finishing forms one of Baltimore's most successful industries. The goods produced are of two general classes, the first consisting of steam, water and gas fixtures and plumber's supplies; the second, of church bells and chimes. The long establishment and successful operation of this industry has created a supply of skilled and intelligent labor. Particularly in the production of church bells has Baltimore attained prominence. One of the works covers six acres of ground, and is, probably, the largest establishment of its kind in the world. The peal of Baltimore bells may be heard in places as far removed as China, Burmah, India, Japan, Liberia, Turkey, Egypt, Brazil, Cuba, Jamaica, England, Bulgaria, Mexico, throughout Canada and the British Provinces, and in every State of the Union.

*Shoes.* The shoe and leather interests of Baltimore fall naturally into two classes, distributive or jobbing establishments and productive or manufacturing industries. As a distributing centre for boots and shoes, this is one of the largest and closest markets in the country. The sources of supply are New England, home manufactures and to a slight extent, New York and Pennsylvania. Sales are made largely in the South. A review of the market for the five years ending in 1891 shows an increased distribution of thirty per cent.; this, in face of growing competition and erection of new factories in all parts of the country.

*Copper Refining.* For many years Baltimore has been the leading centre in the United States for copper refining. Inexhaustible mines in Arizona and Montana are controlled and managed by local interests, and their entire product is shipped to Baltimore either for treatment in the extensive works located at Canton or for shipment abroad. The principal business of the works at Canton is the refining of the ore destined for consumption in this country. This is brought direct from the smelter in Montana to the reducing plant—twenty-five hundred miles by rail—in bulk, without transfer, in the form of matte of sixty per cent. copper, and is here treated in reverberatory furnaces, converted into refined ingot copper, and sold for use in every State in the Union. It goes into all forms of brass and bronze castings. In 1891, over thirty-two million

pounds of this refined copper, known the world over as the "Baltimore Brand," were turned out. Besides the pure copper, a large quantity of copper sulphate or blue vitriol is produced, the sulphuric acid used in the manufacture being also made here.

*Bricks and Tiles.* This industry has already been spoken of under the subject of Clay, in the chapter treating of mineral products. Baltimore pressed bricks have for many years enjoyed high reputation, and shipments are now made to every part of the country. The Baltimore clays are also suitable for terra cotta and roofing tile manufactures. Large plants equipped with improved machinery produce a superior article for roofing purposes, and supply points throughout the north, west and south. Finer goods designed for house decoration rival the imported ware in both elegance of design and in perfection of finish.

*Potteries.* There are in Baltimore five potteries, with twenty or more large kilns, employing about seven hundred and fifty men and women in making and decorating their wares. Baltimore products have attained a high reputation for artistic design and superior workmanship throughout the United States. Local clays are sufficiently fine and free from iron to be suited for the manufacture of the coarser grades of stoneware and pottery, while the three requisites for porcelain manufacture, flint (vein quartz), feldspar, and a fine clay, all occur in excellent quality within the limits of Maryland and the adjoining portions of Pennsylvania and Delaware. Flint is largely quarried in Harford, Carroll and Howard counties; a useful soda feldspar is obtained near Rising Sun, Cecil county, and the best potash feldspar from Brandywine Summit, Delaware county, Pennsylvania. A few of the finer china clays come from Cornwall, England. Maryland coal is also unsurpassed for firing pottery kilns.

*Straw Hats.* Baltimore has been identified with the manufacture of hats for more than a century. Down to the outbreak of the civil war, the city was a leading centre in the production of fur hats, and though there was a considerable falling off in this industry at the time, the close of the war was followed by the rise of a new enterprise—the manufacture of straw hats; and the younger industry soon exceeded the older, both in number of establishments and amount of production: Baltimore has continued to enlarge and increase this trade, and is at present the leading city in the United States in the manufacture of the best class of straw hats. Nine manufacturing establishments are in active operation, with an aggregate capital of about six hundred thousand dollars. They give employment to about five hundred skilled male and seven hundred and fifty female operatives, and the annual product is estimated at upwards of three million dollars.

*Cotton Duck*. Baltimore is the largest manufacturing centre of cotton duck in the world, turning out about two-thirds of the entire amount produced in the United States. The village of Woodberry has been built up largely through this industry, and is its chief site. In addition to local plants, two or three more distant mills contribute to the Baltimore trade. The annual product aggregates some two million yards, giving employment to about five hundred people. Large quantities of yarn and twine are also produced. These goods are in demand in every quarter of the world.

*Shirts and Overalls*. In the manufacture of shirts, drawers, overalls and white goods in general, Baltimore is probably the most important centre in the country. The industry has largely developed from modest beginnings and attained importance by the excellence of its products. One extensive establishment is devoted exclusively to the manufacture of night-shirts. A number of factories are engaged in the production of shirts and overalls and in the manufacture of drawers and cotton goods.

*Confectionery*. Baltimore confectionery has a wide reputation for purity and superiority of composition. Most of the establishments so engaged conduct in addition, a flourishing distributive trade in Mediterranean and West Indian imports. It is estimated that the total volume of business annually transacted in both of these lines aggregates some five million dollars.

*Other Industries*. An immense jobbing trade in dry goods and notions is transacted by Baltimore establishments, largely with northern and adjacent States. Heavy importations are made, and the volume of business transacted in 1892 was estimated as exceeding thirty-five million dollars. Much of the stone, marble, granite and slate quarried in Maryland is made up or marketed in Baltimore. As the mineral resources of the State are being more fully developed, this industry is steadily increasing, and local marbles more generally used. Crockery and queensware are handled by a number of long-established firms. Supplies are largely imported, and Baltimore possesses great advantages as a port of entry for merchandise of this kind. Baltimore pianos and musical instruments in general, are widely and favorably known. One establishment employs some seven hundred men in the manufacture of pianos, famous for their delicacy and excellence. The demands of local boot and shoe factories have stimulated a large trade in leather; heavy shipments are also made to northern and eastern markets. Extensive tanneries in Maryland and Virginia are controlled by the larger dealers. Paints and oils are largely produced and distributed. Well-known brands of ready-mixed paints are prepared here, and the closely allied goods, window glass and paint brushes, are successfully manufactured. Baltimore is the leading distributing point of hardware and tinware

throughout the South. House furnishing goods are also manufactured. The supply of wooden and willow-ware is now almost entirely provided by local factories instead of being drawn as hitherto from the Eastern states. The oldest lithographic establishment in the United States has its parent plant in Baltimore. Several establishments are now in operation, producing work of the highest grade. Baltimore contributes more than one-half of the entire production of curled hair in the United States, and continues to increase her output in this direction. The city is also an important point of distribution for millinery throughout the South and West.

Although the industrial activity of Baltimore is largely concentrated, flourishing manufactures are in operation in such suburban towns as Wetheredsville, Alberton, Granite, Laurel, Phœnix and Mount Washington, and the present tendency seems towards the more general location of manufacturing establishments in the outskirts of the city.

*Sparrow's Point.* The great works of the Maryland Steel Company at Sparrow's Point, on the north branch of the Patapsco, have been already described in the chapter on Mines and Minerals.

*Curtis Bay.* An active industrial settlement has sprung up at Curtis Bay, on the north side of the Patapsco River, a few miles below the city. It embraces about fifteen hundred acres of land with an extensive water front. The water has an average depth of twenty-five feet, permitting vessels of large draught to discharge their cargoes in bulk. Important and varied industries, either established by local capital or attracted from without by the natural advantages and enterprising management of the place, have led to an extraordinary development within the last few years. A large sugar refinery has been erected, and is expected to bring back to Baltimore its early prestige in this industry. Extensive car works are in operation, employing some five hundred men and turning out fifteen new freight cars daily. Nut and bolt factories, an iron foundry, machine shops and a barrel factory are also in operation. A large rolling-mill is in process of erection. Several hundred neat and substantial brick houses have been erected to meet the demands of the growing population, while churches and schools give the locality all the best characteristics of a flourishing industrial centre. The Baltimore and Ohio Railroad has, by means of a branch line, a tidewater terminus at Curtis Bay, thus securing direct connection with the railroads of the county. The settlement is also connected with Baltimore by an electric railway.

*Canton.* Canton is the oldest and one of the most important industrial sections of the city, the corporation to which its present development is due, having been chartered in 1828. The property includes about twenty-three hundred acres of land, with an estimated

UNLOADING THE KRUPP GUN  SPARROW'S POINT, MD

water front of thirty-two thousand feet and a water depth varying from sixteen to twenty-eight feet. It is divided by graded and paved streets into lots suitable for manufacturing and building purposes. The tide-water terminals of the Northern Central Railway, comprising elevators, piers and docks, are located here, securing immediate connection with the entire Pennsylvania system. Canton is also traversed by the tracks of the Baltimore and Ohio Railroad; the Baltimore and Lehigh and the Western Maryland Railroads have access to the property. The industries located here are numerous and varied, including many of those to which reference has already been made. It is in particular the centre of the oyster canning and fruit packing trade, and is the seat of the extensive copper refineries and pottery works already described. Saw and planing mills, iron foundries, brick yards, chemical works, fertilizer manufactories and distilleries are in successful operation. It has been said that one of the most striking industrial advantages of Baltimore consists in the admirable sites it offers for manufacturing purposes. Nowhere is this better seen than in Canton. A large amount of property is here available for industrial enterprise, possessing extensive water frontage and ample railroad facilities.

*Woodberry.* Woodberry is a busy manufacturing section in the north of the city, at the base of Prospect Hill, Druid Hill Park. It is the chief site of the manufacture of cotton duck, of which, as before stated, Baltimore is the largest single producing centre in the world. Extensive iron foundries and machine shops are also located here, covering in all some ten acres of ground. The loom for weaving cotton duck, the turbine water-wheel and cable railway machinery have been developed here. At present from four to five hundred skilled workmen are engaged in the manufacture of all varieties of special machinery. The Northern Central Railway passes directly through the settlement.

## COMMERCIAL ORGANIZATIONS.

The important commercial organizations of Baltimore are as follows:

Board of Trade, Chamber of Commerce.

Merchants and Manufacturers' Association, Hopkins Place and German street.

Corn and Flour Exchange, Chamber of Commerce.

Produce Exchange, 105 South street.

Provision Exchange, Chamber of Commerce.

Builders' Exchange, 19 West Saratoga street.

Canned Goods' Exchange, 413 Water street.

Brick Manufacturers' Exchange, 19 West Saratoga street.

Lumber Exchange, 19 West Saratoga street.

Real Estate Exchange, 203 East Fayette street.

Coal Exchange, 18 West Saratoga street.
Brewer's Exchange, North and Lexington streets.
Tobacco Board of Trade, 419 Exchange Place.
Shoe and Leather Board of Trade, Hopkins Place and German street.
Furniture Board of Trade, 110 East Lexington street.
Taxpayers' Association, 203 East Fayette street.
Old Town Merchants' and Manufacturers' Association, Gay and Exeter streets.
West Baltimore Business Men's Association, 208 St. Paul street.
Southwest Baltimore Business Men's Association, 110 St. Paul street.
East Baltimore Business Men's Association.
Stock Exchange, German near South street.

## CUMBERLAND.

Cumberland has been frequently alluded to as the "Pittsburgh of Maryland." It would certainly be difficult to find a city more favorably situated for manufacturing purposes. Within easy distance are mountains full of the richest red and brown hematite ores. Alleghany county, of which Cumberland is the county seat, contains a fourteen-foot vein of bituminous coal, the quantity of which is almost inexhaustible. It can be delivered in Cumberland at a dollar and fifteen cents per ton. The smaller veins of this coal make excellent coke. Just across the river in West Virginia is found the gas-coal, and along the borders of Pennsylvania is the bituminous coal, so that the worker in metal is enabled to furnish to all purchasers any quantity of iron, from the ingot to the finished tool steel. The Cambria Iron Company have a branch mill in this city, employing two hundred and fifty men. In addition to this are the Cumberland Steel and Tin Plate Company, Shafting and Machine Works, three foundries, one Car Spring Works, and three machine shops, together with the constructon and repair shops of the railroads centering here. Negotiations are now pending for the establishment of other works which will consume the entire output of the Cumberland Steel Company.

Next in importance to Cumberland's advantages as a site for manufacturing purposes, are its large lumber interests. The vast forests of soft and hard wood in Western Maryland and Northern West Virginia are largely owned or controlled by home capital, which is now organizing and establishing mills along the lines of the railways centering at Cumberland. The yards and factories in active operation in the city consume and dispose of millions of feet of timber monthly. In the establishment and prosecution of the industries of this kind home capital has been, for the most part, engaged; there are in prosperous existence one wood pulp paper-mill, with a capacity of ten tons per day

of finished product, three large planing-mills, three building companies, two sash blind factories, three large lumber-yards, one coffin factory, and a number of other smaller concerns.

One of the most profitable industries is that of glass-making, which is represented by two factories, employing a large number of hands engaged in turning out table and prescription ware of a high order. One of these companies organized in 1883 with a capital of fifteen thousand dollars. After having paid ninety per cent. in dividends, and having doubled its capacity at a cost of eighteen thousand dollars, it had, in 1890, seventy thousand dollars over and above all liabilities, and its net earnings for the year 1892 amounted to over eighteen thousand dollars. Beside cheap fuel, Cumberland enjoys the advantage of the Medina sandstone, an almost pure silica, with less than one-half per cent. of sesquioxide of iron.

The Cumberland Hydraulic Cement, used for building and other purposes, takes its name from a vein of that material which crops out in the very heart of the city. The production of this cement employs three mills, turning out a thousand barrels daily. Clay for the manufacture of building brick is abundant, and four large yards are in operation. Outside the city are the mines and works of the Union Mining Company, where the celebrated Mount Savage fire brick is made. The immense fire-clay mines are inexhaustible. At Ellerslie, a few miles distant, are located the Standard Savage Fire-Brick Works. These two corporations furnish employment to several hundreds of men. The city's flouring mills, of which there are three, all using the roller process, turn out 150,000 barrels annually. There are three distilleries and four breweries, the superiority of whose product is largely due to the pure mountain spring water that is used in the manufacture. In addition to these industries, Cumberland has three large tanneries, six cigar factories, one ice factory, two bookbinderies, two marble-yards, two soap factories, one steam laundry and six newspapers, two of which are dailies.

Cumberland's industries, according to a private census taken in October, 1892, furnish employment to 1,043 skilled mechanics and laborers. It is estimated that this will be more than doubled within the next three years, as the extensive improvements contemplated, and now in process of construction, by the Baltimore and Ohio Railroad at the southern end of the city, will afford employment to twelve hundred men. The company has purchased ninety acres of land, upon which repair and construction shops will be erected and tracks laid to accommodate three thousand cars. Three of these new tracks have recently been laid, and two hundred men are now actively engaged in extending the work.

The geographical situation of Cumberland renders it peculiarly adapted for industrial development. It fronts on the north branch of the Potomac River, and is bisected by Will's Creek, the banks of which abound in sites for mills and factories. These natural advantages have been greatly enhanced by the artificial aids of the Chesapeake and Ohio Canal, which forms an outlet to the sea by water, and the convergence of no less than seven railroads at Cumberland, affording abundant facilities for the shipment of products manufactured within its gates to the markets of the United States.

### HAGERSTOWN.

The manufacturing industries of Hagerstown include, in all, over one hundred establishments, furnishing employment to an average of over twelve hundred and fifty mechanics.

Of the leading industries, a few may be noted. In the manufacture of gloves, one factory employs an average of one hundred and fifty hands, almost wholly young women, producing an average of over $75,000 per annum, in that special line of products, the largest output of any factory in the country. In the manufacture of bicycles, great development has occurred within the last few years, two large factories, employing three hundred workmen, with an annual product of $250,000, being now engaged in the industry. One silk mill gives employment to one hundred and sixty operatives, and has a product yearly, of over $200,000. There are two knitting mills, one of underwear, employing one hundred hands, with a product of $75,000, and one of hosiery, employing eighty hands, with a product of $70,000. One shirt factory, employing sixty hands, yields a product of $50,000. Another factory gives steady work to forty skilled mechanics in building pipe and cabinet organs, and is rapidly increasing its reputation and output. The value of the annual product of bricks, all used here, and falling short of the demand, exceeds $250,000. In the manufacture of furniture, one factory makes extension-tables exclusively, another is general in its product. Together they employ over one hundred workmen and produce wares of over $100,000 in value. Other manufactures of wood include mills making wheel and carriage stock, employing over one hundred and fifty workmen, and handling more than $150,000 of finished products. One firm annually exports over $125,000 of hardwood in bulk and dimension lumber. One paper mill has an annual product of twelve hundred tons of white paper, and sells in addition, fifteen hundred tons each year. Of the wholesale trade in confectionery, exceeding $100,000, more than half is manufactured here. The available banking capital of the city exceeds one and a half millions.

## FREDERICK.

Frederick has long enjoyed the reputation of being the county seat of the third largest agricultural county in the country. More recently the city has advanced rapidly in industrial progress, and now offers unusual advantages for the establishment of small industries. The population of the city is at present, in round numbers, about ten thousand.

Frederick is the home of the Louis McMurray Packing Company, the Frederick City Packing Company, the Union Knitting Mills, the Palmetto Fibre Company, the latter a large and very important enterprise engaged in the manufacture of all kinds of brushes from the Palmetto fibre of the Southern States; the Frederick Elevator Company, operating a grain elevator of fifty thousand bushels capacity, which receives and ships the grain raised by the farmers of the rich Frederick and Middletown valleys; the Hygeia Ice Company, manufacturers of artificial ice on a large scale; the Frederick Spoke Works, manufacturing wagon spokes and similar products from native hickory; a factory of straw hats, and numerous minor industries that contribute to the enterprise and the general prosperity of the county. Many of these industries were established in 1890 under the stimulus of the Frederick City Manufacturing Company.

In the adjacent county, the point of most rapid growth and importance at present is Brunswick, two years ago a sleepy little hamlet of two hundred souls, now a flourishing town of two thousand inhabitants. The change has been largely brought about by the establishment at that point of the large freight-distributing yards of the Baltimore and Ohio Railroad Company. Middletown, Mechanicstown, Emmitsburg and Liberty are also flourishing towns, toward which the same spirit of enterprise has reached. The construction of a railroad through the Middletown valley, connecting the principal points with Frederick on the main line of the Baltimore and Ohio and Western Maryland Railroads, is now being agitated, with every prospect of eventual consummation. Frederick's present railroad facilities consist in a connection with the main line of the Western Maryland, the Frederick Division of the Pennsylvania Railroad, which extends from Columbia, Pennsylvania, to Frederick, connecting at Columbia with the main line of the great Pennsylvania system. A short special branch of three miles also connects the city with the main line of the Baltimore and Ohio at Frederick Junction. The city is thus brought within two hours and a half of Baltimore, five hours of Philadelphia, and seven hours of New York, while all western connections are readily accessible.

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### OTHER MANUFACTURING CENTRES.

*Annapolis.* With all its historic opportunities and natural advantages, Annapolis has not progressed commercially as have other cities of the same age. Still it possesses respectable business industries. The shipping of oysters to the North and West has, for many years, been a profitable business. A glass factory is also in operation. A marine railway is located in the suburbs of the city, and carries on a flourishing business. The Farmers' National Bank and the Annapolis Savings Institution offer all necessary banking facilities. Four printing establishments supply the requirements of the public, and furnish the daily and weekly news. Annapolis is the terminus of two railroads, the Annapolis, Washington and Baltimore Railroad, and the Annapolis and Baltimore Short Line.

*Cambridge.* Cambridge ranks as the third largest oyster centre in the State. The boats engaged in the trade represent a capital of three hundred and fifty thousand dollars. The annual catch aggregates four hundred and thirty-five thousand bushels, creating a fund of two hundred and eighty thousand dollars paid to four thousand men engaged in the business. The oysters are packed and shipped by several packing establishments to all parts of the country. Daily communication is afforded with Baltimore and river points by two lines of steamboats, and with Philadelphia and the north by the Cambridge and Seaford branch of the Pennsylvania Railroad. Cambridge also contains a large manufacturing company, several lumber mills, two shirt factories, two brick kilns, three ship-yards and two phosphate factories. The town has a taxable basis of $1,800,000 and two national banks. Besides these industries, Cambridge is largely engaged in the catching and shipping of crabs, herring, shad and other products of the water. In the season, it is a centre for the shipment of much of the farm produce of the adjacent country.

*Havre-de-Grace.* The natural location of Havre-de-Grace, near the mouth of the Susquehanna river, has made it the centre of the important shad and herring fisheries in the vicinity. The cutting and storing of ice engages many of its residents during the winter months, and ducking is, in favorable seasons, a source of considerable revenue. A steam flouring mill, canning establishments, a fertilizer factory and saw and planing mills are in successful operation. Situated in close proximity to Baltimore and Philadelphia, in the midst of a rich agricultural country with ample railroad facilities, Havre-de-Grace possesses many opportunities for industrial development.

*Easton.* Vigorous efforts have been made within the last few years to develop the manufactures of Easton. Healthy climate, cheap land and living, low rents and abundant transportation facilities, are all favorable to this movement. Already manufactures of commercial fertilizers,

flour mills, brick and tile yards and canneries are in successful operation. Smaller but flourishing industries are manufactories of shirts, washing machines, brooms, carriages, chairs, and window sash, and a number of well equipped machine shops and foundries. A creamery is in flourishing condition, and a large ice factory and another packing house will be built this summer. Two railroads and two steamboat lines afford quick communication with Philadelphia, Baltimore and Norfolk. While still retaining its character as a county -seat, Easton is fast becoming a manufacturing town.

*Salisbury.* Salisbury, advantageously situated at the head of navigation on the Wicomico river, at the junction of the Eastern Shore and Wicomico and Pocomoke Railroads, is the centre of a large and valuable trade in lumber, having regular communication with Baltimore and Washington, and thence with all markets East and North. It is estimated that the annual manufacture of planed lumber aggregates eight million feet, a considerable part of which is consumed by local factories in making peach baskets and strawberry boxes and crates. In addition to this, about eight million feet of Virginia boards are annually used in the manufacture of oil cases. The surrounding country is well adapted to the cultivation of berries and truck farming, and a large part of this product is shipped from Salisbury. Altogether the town is one of the most flourishing and enterprising on the Peninsula, and the annual volume of its business has been estimated as exceeding one million dollars.

*Chestertown.* The characteristics of Chestertown as a town and place of residence have been described elsewhere. Kent county, of which it is the county seat, is oné of the most productive sections of the State, and upon its products the trade of the town is largely dependent. The advantages which Chestertown offers to industrial enterprise have, however, been by no means neglected. One establishment is engaged in the manufacture of straw board, and turns out sixteen tons of the completed product daily. Another manufactures peach baskets, which are used throughout Maryland, Delaware and New Jersey. Other industries are canneries, a drying-house, brick-yard, creamery, ice factory, planing-mill, fertilizer factories, flour mill and iron foundries. The town enjoys excellent steamboat and railroad facilities.

*Elkton.* Elkton, the county seat of Cecil county, has undergone marked industrial development within the last few years. The erection of extensive pulp mills for the manufacture of paper has of itself given a material impulse to its prosperity. A large plant for the manufacture of fertilizers, extensive machine shops and the growth of fruit and vegetable canning, indicate the importance and the industrial possibilities of the town. Its contiguity to the large manufacturing centres, Philadelphia, Wilmington and Baltimore, and its ample facilities for

transportation by railroad or water, are highly favorable to its growth. Barge and boat-yards have been recently established at Elk Landing, near the town. These are controlled by Pennsylvania capitalists, and have been removed from that State on account of the greater advantages of Elkton.

*Port Deposit* is an important point for trade in stone and granite. The quarries in the neighborhood give employment to some two hundred men. Stoves and tin cans are also manufactured. *Crisfield* is one of the great oyster centres of the State. Large quantities of fish and soft crabs are marketed here, and a considerable part of the produce of the surrounding country. *Ellicott City* is the site of a considerable part of the milling industry already described. *Belair* is the county seat of Harford county and contains a number of large canneries and other manufacturing establishments. Scattered throughout the State are many hundreds of local manufactures—oyster canneries, fruit packing establishments, planing mills, ice factories, iron foundries, flour mills and ship-yards.

# CHAPTER XI.

## CITIES AND PUBLIC BUILDINGS.

### CITIES.

Maryland has always been an essentially agricultural, rather than a manufacturing state. Peculiar causes led to the early commercial development of Baltimore, and this pre-eminence has since been maintained. The State as a whole is accordingly characterized rather by a relatively large number of agricultural and tidewater settlements, than of great industrial centres. The population of the thirty-three cities, towns and villages having one thousand or more inhabitants as returned by the census of 1890, in the order of their rank, is as follows:

| Cities, Towns and Villages. | Counties. | Population. | | Increase. | |
|---|---|---|---|---|---|
| | | 1890. | 1880. | Number. | Per cent. |
| Baltimore city | ........... | 434,439 | 332,313 | 102,126 | 30.73 |
| Cumberland city | Allegany | 12,729 | 10,693 | 2,036 | 19.04 |
| Hagerstown city | Washington | 10,118 | 6,627 | 3,491 | 52.68 |
| Frederick city | Frederick | 8,193 | 8,659 | ........ | ........ |
| Annapolis city | Anne Arundel | 7,604 | 6,642 | 962 | 14.48 |
| Cambridge town | Dorchester | 4,192 | 2,262 | 1,930 | 85.32 |
| Frostburg town | Allegany | 3,804 | ........ | 3,804 | ........ |
| Havre de Grace city | Harford | 3,244 | 2,816 | 428 | 15.20 |
| Easton town | Talbot | 2,939 | 3,005 | ........ | ........ |
| Salisbury town | Wicomico | 2,905 | 2,581 | 324 | 12.55 |
| Westminster town | Carroll | 2,903 | 2,507 | 396 | 15.80 |
| Chestertown town | Kent | 2,632 | 2,359 | 273 | 11.57 |
| Sparrow Point town | Baltimore | 2,507 | ........ | 2,507 | ........ |
| Elkton town | Cecil | 2,318 | 1,752 | 566 | 32.31 |
| Catonsville village | Baltimore | 2,115 | 1,712 | 403 | 23.54 |
| Laurel town | Prince George | 1,984 | 1,206 | 778 | 64.51 |
| Port Deposit town | Cecil | 1,908 | 1,950 | ........ | ........ |
| Pocomoke city town | Worcester | 1,866 | 1,425 | 441 | 30.95 |
| Rockville town | Montgomery | 1,568 | 688 | 880 | 127.91 |
| Crisfield town | Somerset | 1,565 | 986 | 579 | 58.72 |
| Westernport village | Allegany | 1,526 | 1,468 | 58 | 3.95 |
| Hyattsville town | Prince George | 1,509 | 288 | 1,221 | 423.96 |
| Ellicott City town | Baltimore and Howard. | 1,488 | 1,784 | ........ | ........ |
| Snow Hill town | Worcester | 1,483 | 1,276 | 207 | 16.22 |
| Belair town | Harford | 1,416 | ........ | 1,416 | ........ |
| Saint Michael town | Talbot | 1,329 | 1,175 | 154 | 13.11 |
| Centerville town | Queen Anne | 1,309 | 1,196 | 113 | 9.45 |
| Williamsport town | Washington | 1,277 | 1,503 | ........ | ........ |
| Northeast town | Cecil | 1,249 | 988 | 261 | 26.42 |
| Sharpsburg town | Washington | 1,163 | 1,260 | ........ | ........ |
| Chesapeake City town | Cecil | 1,155 | 1,402 | ........ | ........ |
| Oxford town | Talbot | 1,135 | 689 | 446 | 64.73 |
| Oakland town | Garrett | 1,046 | 910 | 136 | 14.95 |

In the following pages reference is made only to the fifteen having a population of two thousand or more.

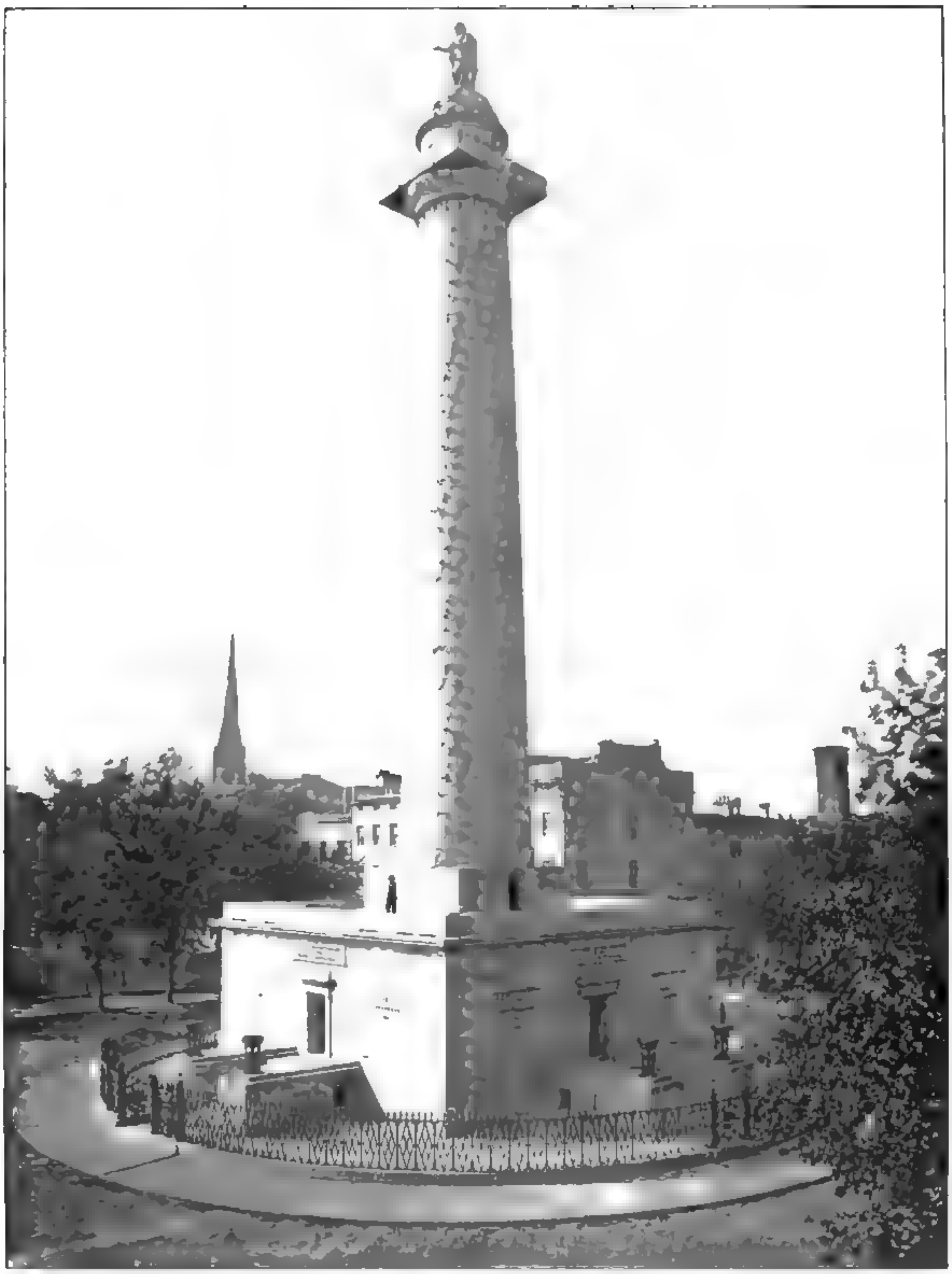
## BALTIMORE.

Baltimore, the principal city of Maryland, is situated on the Patapsco river, at the head of navigation, about fourteen miles from the Chesapeake Bay, in 39° 17′ north latitude, and 76° 37′ west longitude from the meridian of Greenwich. Its distance from the Atlantic by the Chesapeake Bay is two hundred and four miles. The nearest neighboring city is Washington, distant thirty-nine miles by rail.

A small stream called Jones's Falls divides the city into east and west Baltimore, and empties into the Patapsco, which is here a considerable estuary of the Bay, and indenting the land with its middle branch and southwest branch, as they are called, enables vessels to ascend to the heart of the business quarters of the city, where the principal harbor is prolonged into a small interior harbor called the basin. That part of the city which lies south of the basin, and projects into the Patapsco into the form of an irregular peninsula, at the extremity of which Fort McHenry is built, is called South Baltimore. The entire area of the city is thirty-one and a half square miles.

The land rises regularly from the water's edge northward in a series of undulations which throw the whole surface of the city into a succession of gently rising hills, the sides of which slope toward the Patapsco or toward the tortuous course of the Falls. These elevations toward the north, northwest and northeast of the city reach a considerable height, commanding fine views of the city and river. Beyond the city limits the same undulating and gently-rising country continues for many miles, and indeed to the northern boundary of the State. The hill-sides, to a considerable extent covered with natural woodland, and sloping down to small dells drained by rivulets, are dotted with villas and handsome cottages. No city affords more varied and attractive sites for suburban and rural residences; and the moderate price of land enables even persons of very limited means to have country homes amid scenery of exquisite beauty, within an hour's or even a few minutes' ride from the city.

It was the possession of its fine harbor with its extraordinarily extensive water front that enabled Baltimore so rapidly to outstrip her older colonial rivals, and to seize and keep the commercial supremacy. Founded, as has been related in a previous chapter, in 1730, in 1775 Baltimore numbered 6,755 inhabitants; in 1790, 13,500; and in 1890 (according to the police census of that year), 455,427. Of these, 77,033, or about one-sixth, were negroes and mulattoes.



WASHINGTON MONUMENT, BALTIMORE, MD.

*Government.* The municipal government of Baltimore is vested in a Mayor, elected biennially, and a City Council of two branches. The first branch is composed of twenty-two members, one from each ward, elected annually, and the second branch of eleven members, one from every two wards, elected biennially. The principal departments are: A Tax Department, the head of which is a City Collector, with an Appeal Tax Court to correct and adjust assessments; a Register's office and a Comptroller's office; a Department of Finance, consisting of the Mayor and two (unsalaried) citizens of his appointment, which has charge of the public debt and other matters of municipal finance; a Law Department, consisting of a City Counsellor, a City Solicitor, an Examiner of Titles, and a City Attorney, who advise the executive in legal matters, and have charge of municipal litigation; and a City Commissioner, who controls the paving, sewerage, &c. In addition there are Boards of Commissioners for Police, Water-Supply, Public Schools, the Harbor, Fires, Parks, &c., whose duties are indicated by their titles.

*City Hall.* The bureaus and offices of the city government are in the City Hall, an imposing structure of white Maryland marble, covering an area of over 30,000 square feet. The architectural style is the Italian Renaissance. The design is a central mass with lateral wings, inclosing courts which give light to the interior rooms. From the centre rises a dome, supported by columns resting on a marble base, and surmounted by a lantern and finial 236 feet from the ground. The principal approach is on Holliday street by a marble portico. The building occupies an entire block, thus presenting a façade to each street, and from whatever point viewed the effect is pleasing and impressive. A circumstance connected with its erection is unusual in the history of similar public buildings. Not only were all the expenses of building and finishing covered by the original appropriation, but a balance of $228,865 remained unexpended and was returned to the City Treasury.

*Fire Department.* This is controlled by a Board of Fire Commissioners of six members, with the Mayor as a member *ex-officio.* It is equipped with fifteen engine companies, nine hook-and-ladder companies, seven chemical engines, and a fire-boat for harbor use. The permanent force consists of two hundred and thirty-three men, besides fifty call-men, who are summoned when required. A salvage corps for the rescue and protection of endangered property co-operates with the fire department, but it is an independent organization supported by the local Board of Underwriters.

*Police.* The police of the city is controlled by a board of commissioners of three members, appointed by the State Legislature. The active force consists of a Marshal, Deputy Marshal, with the necessary subalterns, and six hundred and forty patrolmen. The city is divided into seven

police districts, each with its station-house. An alarm telegraph and telephone system connects the whole and extends over the whole city, and patrol wagons can instantly be summoned in case of accident or other emergency. The suburban districts are patrolled by a mounted force, and a steam patrol boat protects the harbor.

*Water Supply.* This has been fully described in a previous chapter. It will be sufficient here to recapitulate that it is derived from two sources—the Gunpowder river and Jones's Falls. The water is stored in five artificial lakes—Loch Raven and Lakes Montebello and Clifton for the Gunpowder system, and Lake Roland and Druid Lake with the Hampden High Service, and Mount Royal reservoir for the Jones's Falls system. These with the conduits and distributing mains have an aggregate storage capacity of about 3,000,000,000 gallons, and a daily supply capacity of 165,000,000 gallons.

*Health Department.* The chief executive officer of this department is the Commissioner of Health, appointed annually by the Mayor, and invested with powers to deal with everything that concerns or imperils the health of the city. In connection with this department is the city morgue, at the foot of President street.

*Courts.* The courts of Baltimore have been described elsewhere. The courthouses are three ancient structures on Calvert and St. Paul streets, south of Lexington; but as these are about to be superseded by a fine modern structure, suitable to the needs of the city, we shall not occupy our space with the description of obsolete relics that have outlived their usefulness and will soon disappear.

*Post-office.* This is a new and handsome building, erected by the federal government and completed in 1890. It occupies a large part of the block between Lexington and Fayette streets, immediately west of the City Hall. It is built of Maine granite, and the design is a hollow parallelogram, the facade being broken by a centre position flanked by two towers. The basement is used for the reception and storage of mail matter. The proper work of the post-office occupies the first floor, while on the second floor are located the offices of various federal officials. The third floor is occupied by the federal courts.

*Custom House.* The Collector of Customs, with his staff, has for many years been housed in the old Merchants' Exchange building at the corner of Gay and Lombard streets. It is entirely inadequate to the needs of the city, and very ugly; and it is to be hoped that before long it will be replaced by a more creditable structure.

*Parks.* There is nothing of which Baltimoreans have juster reason to be proud than of their beautiful parks and public squares. The largest of these, Druid Hill Park, to the north-west of the city, contains 700 acres, and had been, before its purchase by the city, the country seat

CITY HALL, BALTIMORE, MD

of a family whose good taste had, for generations, preserved its natural beauties. In these it probably stands alone among American city parks. The diversity of hill and dale, deep woodlands threaded by winding paths, dense thickets, the coverts of deer, bright stretches and slopes of green sward, crystal streams and springs, lakes and ponds, present pictures of exquisite beauty, changing at every moment.

The city has carefully preserved these natural beauties, and enhanced them by judicious treatment. Drives, bridle-paths and foot-paths, enable the thousands who visit it daily to enjoy all its charms, whether their tastes lead them to mingle with the lively throngs always to be found in the vicinity of the "Mansion House" or the lake, or to seek the meditative solitude and silence of the woods. Lines of cars convey visitors to it from every part of the city, and it is a favorite resort of all classes of society.

The Earl of Meath, who visited this country in 1890, and devoted especial attention to the parks of American cities, published an article on the subject in the *New Review* (Vol. II), in which he says that "as a lovely specimen of the forest park, Druid Hill was the finest among those that I visited in the United States."

The main entrance is on Madison avenue. To the right is Druid Lake, with a driveway of a mile and a-half running around it. In other parts are lakes and ponds for boating and skating and for the propagation of fish. In a special inclosed pond are a pair of sea lions. Groves are arranged with shelters for picnics and with playgrounds for children, and there are grounds kept in order for base ball, tennis and other outdoor sports. Near these are the public buildings—the Mansion House, with spacious verandas, dining and lunch-rooms, and the Maryland House, transported from the Centennial Exposition of 1876, with collections illustrating the fauna and other natural productions of the State. Near these buildings is a small zoological collection and an aviary.

A fine herd of deer roam at large in the woods, a flock of Southdown sheep pasture in the fields under charge of a shepherd in authentic costume, and a stable and a paddock are allotted to a pair of dromedaries of the finest breed, presented by the King of Italy to the late John W. Garrett. The park is supported by a tax of nine per cent. on the gross receipts of the street car companies.

If Druid Hill illustrates the forest park, a handsome specimen of the artificial, or garden park, is presented by Patterson Park, a favorite resort of the inhabitants of the eastern section of the city. This is entered from the avenue of the same name by an imposing marble gateway, on passing which the visitor's attention is arrested by a large fountain with a basin fifty feet in diameter. In all directions lie beds of flowers and shrubs, presenting a charming picture. A conservatory contains a fine

collection of rare and exotic plants, palms, etc., and a lake in the southeast corner is usually gay with small boats. In this park may still be seen a part of the earthworks thrown up by the citizens in 1814, when Baltimore was threatened by the British forces, as related in the first chapter of this work.

On that part of the peninsula before described which lies beyond and to the south of the basin, is Federal Hill Park, an elevated plateau, eighty-five feet above the water. On this plateau, during the late war, rather formidable earth-works were constructed by the federal forces, and mounted with heavy guns directed upon the city, which it overlooks. It was, fortunately, never thought necessary to use them; and after the restoration of peace, "grim-visaged war smoothed his wrinkled front" in this particular locality, the ramparts were levelled, and the surface adorned with trees, shrubs and flower-beds. The crest of the plateau commands an interesting view of the city and harbor.

South of this plateau is Riverside Park, overlooking the Patapsco river, the fort and the bay as far as North Point. In Northwest Baltimore is Harlem Park, distinguished for the beauty of its gardening.

*Squares.* The squares, or ornamented spaces in the residence sections of the city, are too numerous to describe in a work like this. We may single out for mention the largest and most beautiful, Eutaw Place, a series of squares extending from Lanvale street to North avenue, laid out in grass and flower-beds, diversified by shrubbery and fountains. Mount Vernon Place and Washington Place are the four squares at the base of the Washington Monument. They are adorned with flowers, trees and fountains. The visitor's eye is especially attracted by the beautiful bronze statuary, which are the chief ornaments of these squares. A colossal lion by Barye, four allegorical groups by the same master, and a noble figure by Dubois, representing a youthful warrior in Gaulish costume, seated and leaning upon his sword, entitled "Military Courage," adorn the western square, and are the gift of W. T. Walters, Esq. The northern square has a statue of Chief Justice Roger Brooke Taney, and the eastern one of George Peabody, both of heroic size. Fronting on the square are the Mt. Vernon Church, the Peabody Institute and many tasteful private residences.

*Monuments.* Baltimore is often called "the Monumental City"; but this designation arose not so much from the number of its monuments, as from the fact that it was the first city in America that could boast a worthy monument to Washington. The Washington Monument, erected by the State of Maryland, and finished in 1829, is a Doric column of white Maryland marble, 164 feet in height, rising from a marble base 50 feet square and 24 feet high, and surmounted by a statue 16 feet in height, representing Washington in the act of resigning his commission.

A winding staircase in the interior leads to the plinth, which is guarded by a parapet, and from it an extensive view can be had of the city, harbor and surrounding country.

Battle Monument, in Monument Square, commemorates the Baltimoreans who fell in defense of the city at the battle of North Point, September 12, 1814.

In the grounds of the Samuel Ready Orphan Asylum stands a slender shaft of brick, covered with stucco, which is interesting as the first monument raised in the New World to the memory of Christopher Columbus. It was erected in 1792 by the Chevalier d'Anmour, the French consul; and for thirty years was the only monument to the great navigator in the hemisphere which he discovered. One hundred years after its erection, a statue of Columbus, presented by the Italian residents of Baltimore, was unveiled in Druid Hill Park.

Other monumental memorials are the Wells and McComas monument, the Wildey monument, the Wallace statue, in Druid Hill Park, and the cippus which marks the grave of Edgar Allan Poe.

*Residences.* The domestic architecture of Baltimore is characterized rather by substantiality and comfort than by show and splendor. Few, if any private houses are of the style which reporters call "palatial." Nearly all the residences are of brick, ornamented, in those of the better class, with string courses, lintels, and other trimmings of marble or sandstone of various hues. Of late years there has been a decided tendency to improve the domestic architecture by introducing novel designs and variety of building materials. Sandstone of various tints, from a deep maroon to a bright russet, marble, gneiss, fine gray freestone, green serpentine, bricks of different colors, diversify the streets with a pleasing polychromatic effect.

In some sections of the city the visitor is surprised by the great number of small but decent houses, inhabited for the most part by workmen with their families. Baltimore has never taken kindly to tenement-houses and lodging-houses; and the cheapness of rents enables nearly every married workingman to have a home of his own; so that Baltimore is emphatically a city of homes. When we consider the advantages to the health, comfort, independence and morality of the workingman that gather around his "ain fireside," we can cheerfully accept the loss of architectural display.

*Clubs.* The inveterate domesticity of Baltimoreans has probably been the cause that the clubs are less numerous than would be expected from the size of the city, though of late years there has been some change in this respect. The Maryland Club, founded in 1857, is the oldest and most important, and has recently removed to a stately new building of white marble, at the corner of Charles and Eager streets,

which is one of the most ornamental buildings in the city. In addition, there are the Baltimore Club, the Athenæum Club, the University Club, the Germania and the Phœnix clubs, besides others of less numerous membership.

The Masonic lodges have temporary quarters in the former United States court house on Fayette street, pending the rebuilding of their temple on Charles street, destroyed by fire a few years ago. The Order of Odd Fellows have recently built a fine hall at the corner of Saratoga and Cathedral streets.

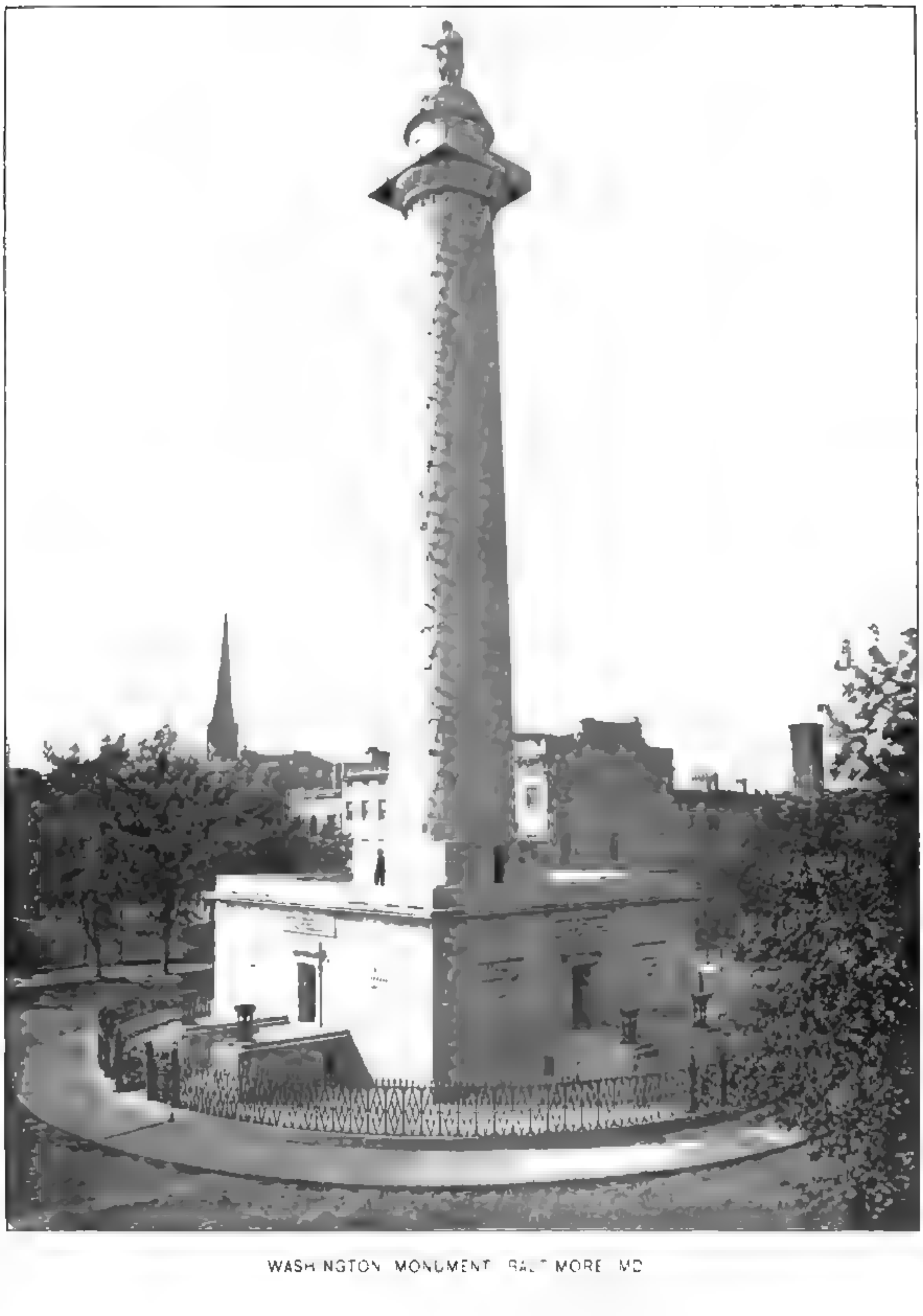
Other institutions of Baltimore, as well as its commerce and manufactures, are treated under their appropriate heads.

The medial position of Baltimore, exempting it from the excessive rigors of winter and the exhausting heats of summer, contributes largely to making it one of the healthiest of American cities. According to the police census of 1890 the population of that year was 455,427, and the total mortality of the same year was 10,198, giving a total death-rate of 22.41 per thousand. The white mortality was 8,057, out of a white population of 384,394, or a death-rate of 20.98; and the colored mortality 2,141 out of a population of 71,033, or a death-rate of 30.15.

### ANNAPOLIS.

The most interesting survival of Maryland's past is her ancient capital, Annapolis. Two and a-half centuries have rolled away full of the most surprising changes, and yet this relic of Old Maryland is as full of interest to-day as ever in her long history.

Thirteen years after the establishment of the proprietary government at St. Mary's in the year 1647, an invitation was extended by Governor Stone to a colony of non-conformist Puritans settled in the lower counties of Virginia, and much disquieted by the authorities of that colony, to enjoy perfect religious freedom within the borders of Maryland. For a year they hesitated, but fresh persecutions were upon them, and the offer was accepted. During the early spring and summer of 1649 the emigration continued from Virginia. Thankful for their preservation and happy at finding a home where peace and security were guaranteed them, the Puritans named their new settlement "Providence." At first a long stretch of plantations along the shores of the bay and its tributaries, the Puritan settlement could not be protected from the Indian marauders that nightly threatened, and gradually we mark the tendency to centralize upon one spot at the mouth of the Severn, where their meeting-house stood. Here Anne Arundel Town, later called Annapolis, had its beginning. As the soil was fertile and well cultivated, this section grew to be the richest in the Province.



WASHINGTON MONUMENT, BALTIMORE, MD.

but little, her commerce decreased, while many of her better citizens moved to Baltimore and Washington. The establishment of the Naval Academy here in 1845, marks the beginning of the naval regime in the history of Annapolis, an important factor economically and socially.

During the Civil War, Annapolis became an army town, and thousands of troops were quartered within her limits, while a large "parole" camp lay on the outskirts. So menaced was she at times that the Naval Academy had to be removed to Newport until hostilities had ceased.

Since the war her population has doubled and her material prosperity greatly increased, though Annapolis will probably always be noted more for its social opportunities and the hospitality of her citizens, than as a pushing business-like modern city.

*Colonial Houses.* To the architect, the old houses of Annapolis present an interesting study, as among the purest and most complete examples of what is known as the "Colonial Style." Of the seventeenth century buildings, few survive here or in the State, or at most, so modified as to be scarcely recognizable. Passable exceptions are the house at the corner of Church and Conduit streets, and the building used as the Treasury, on State House Hill.

Of the class of houses termed "mansions," the Carroll house, now a part of the Redemptorist seminary, is one of the earliest, as indicated by the massive simplicity of its style. A garden terraced towards the water was the usual adjunct of these homes, and while they had a townward entrance the more pretentious front generally overlooked the garden toward the bay. Intrinsic evidence, as shown in the change from a somewhat primitive construction to the style of William and Mary, recalling the Dutch taste of Hampton Court, and then to the Georgian, lost in turn in the greater elegance of the French influence of Louis XV architecture, may be traced distinctly in Annapolis mansions. Taken in historical sequence we have the Tydings house; the Treasury; the Randall house, built 1730 by Thomas Bordley; the Carroll mansion; the Brice house, corner East and Prince George streets, 1740 probably; the Iglehart house, Prince George street; its opposite neighbor, the Paca house; the Claude house, Shipwright street, and the Ridout mansion, Duke of Gloucester street; the Mason house, built by Governor Ogle 1742, and St. John's College (McDowell Hall); the Randall house, Market Space, and the house of Antony Stewart, of "Peggy Stewart" fame, Hanover street. The City Hotel, Washington's hostelry, belongs to an early period, while the Chase mansion, built by Governor Lloyd, and the Lockerman house opposite, built 1770, plainly show the growth of French influence in plan and decoration.

In the more modern dwellings of the colonial period the hipped roof, similar to the French mansard, though without an ornamental

character, was almost universal and covered many a comfortable home of those days. One of the houses of this character, on Charles street, is noted as the printing office and dwelling of the editor of the *Maryland Gazette*, published here since 1745. Another on State House circle, the Franklin house, is a specimen of the hipped roof colonial dwelling. Old Annapolis consisted mostly of this sensible style of building, varied occasionally by the very high-pitched roof, both picturesque and suited to storm and sun.

Most of these humbler dwellings have disappeared, or, by modification or additions, have lost all their original architectural character.

The State House and other public buildings of Annapolis are described elsewhere in this volume.

*Municipal Institutions.* Annapolis is governed by a Mayor, Recorder and Aldermen, deriving authority from a charter granted in 1708, and since amended by the Legislature. St. John's College, four public schools, three parochial schools, and five private schools, provide ample educational facilities. Protection from fire is assured by a steam fire engine, two volunteer hose companies, a hook and ladder company and the fire organization connected with the United States Naval Academy. Water and gas supply are in the hands of private corporations.

### CUMBERLAND.

The location of Cumberland, the county seat of Alleghany county, and the second city of Maryland in point of importance, size, manufacturing interests and population, is in the northwestern part of the State, one hundred and seventy-eight miles, by rail, from Baltimore city. It is on the boundary line that separates Maryland from West Virginia—the Potomac River—at the intersection of Wills' Creek with the river. Its precise geographical position is longitude 78° 45′ 25″ and 39° 39′ 14″ north latitude; its altitude is seven hundred feet above sea level. The land upon which the city is built was originally owned by Governor Thomas Bladen, who disposed of it to George Mason, of Fairfax county, Va., to whom a grant, by letters patent, was made on the 25th of March, 1756. In October, 1783, it was purchased by Thomas Beall, of Samuel, for $1,407.10. In 1785 Mr. Beall laid off the town, the county of Alleghany having about this time been separated from Washington county, of which it formed a part. In 1787 articles of incorporation were drawn up and presented to the Legislature, who granted the privileges asked for. Before this the town, which contained but thirty-five families, was known by the name of Washington Town. A desire on the part of the inhabitants for a more distinctive name was manifested, and the one borne at the present time was selected in commemoration of Fort Cumberland, which had been erected on the site by Gov. Dinwiddie, of

Virginia, as a defence against the French and Indians in 1754, and around which the first houses had been built. The commanding site of old Fort Cumberland is at present occupied by Emmanuel Episcopal Church and some beautiful private residences, and is one of the prettiest spots in the State, commanding a magnificent view of the city and surrounding hills and valleys. In 1794 the first levy of $200 was made for the erection of a court-house, to be located adjoining the site of the old fort. Other levies were made up to 1799, when the total amount expended on its construction amounted to $612.10. On January 1, 1795, Cumberland was made a postoffice, established by order of the Postmaster-General, and with its courthouse and postoffice, became entitled to be recognized by the outside world as a place of local habitation. The woodsman's axe, border civilization and the progress of a century have cleared the way gradually, until there nestles in a basin at the hills and lofty mountains that almost completely surround it, one of the most beautifully located, energetic and bustling cities in the country.

The business portion of Cumberland is built on the flats, banked on the south and west by the north branch of the Potomac river and Wills' creek, while on the rising ground on the east, north and west side are the residence portions. Handsome private buildings mark the homes of its citizens along broad and shady streets, while the towering verdure-clad slopes of Wills' mountain form a background to a noble panoramic view. The city has a breathing place in "Narrows Park," out on the National road, the substantial construction of which by the United States government before the days of the locomotive, makes it the chief of all promenades and carriage-ways. This popular road winds through an immense cleft in the mountain, known as the "Narrows," whose rocky sides stretch perpendicularly a thousand feet on either side, leaving a chasm a little over a hundred yards wide, through which roll the waters of Will's Creek. Flanked on both sides by railroads and the National highway, it is a veritable gateway from the north entrance into the city. A short distance from the Narrows entrance is the park. Across a little valley from that place are situated the base-ball and athletic grounds, and two miles further west is the Alleghany Grove camp ground, filled with neat cottages. At the southern end of the city lie the Tri-State Exposition grounds—embracing a large enclosure, in which is an excellent half-mile regulation track, numerous stables for horses, a grand stand for spectators and large halls and exposition buildings. Those points of interest in the suburbs are reached from all points of the city by six miles of electric street railway operated by the trolley system. Among other points outside of Cumberland well worth visiting are the coal mines, to which four different routes by rail are at the choice of the tourist. An hour's ride, on any of them, will place him at the mouth of one of the large

mines that have so greatly contributed to Cumberland's prosperity. In the city itself, which has a population of fourteen thousand, there are many points and features of interest. It has fifteen miles of paved streets, the most frequented being laid in vitrified brick. It is well illuminated by gas and electricity, and the water supply from the river is abundant.

The city's officials consist of a mayor and eleven councilmen, city clerk, treasurer and a tax collector. These officials have their quarters in the City Hall, a large, handsome building, erected in 1874, and occupying the square bounded by Frederick, North Centre, North Liberty and Bedford streets. The entire ground floor of this building is occupied as a meat and vegetable market; the second floor by the Academy of Music, the seating capacity of which is over one thousand persons. Lodging rooms and city offices take up the rest of the structure. In the rear of the City Hall is the Market Square, Station House and the Pioneer Hose Company's building. Thirteen policemen make up the force of the city's guardians. The fire department at present consists of four volunteer companies. The taxable basis of the city on June 1, 1892, was $6,845,548, and the tax rate was placed at eight mills.

The educational needs of the city are amply provided for by seven public and six parochial schools, one high school and the Alleghany County Academy. Its religious world worships in eighteen churches, representing all creeds. The handsomest of these are owned by the congregations of the Presbyterian, Emmanuel Protestant Episcopal, Methodist Episcopal, Saints Peter and Paul's and St. Patrick's Catholic. In connection with Saints Peter and Paul's Church there is a convent in charge of the Ursuline nuns, and a large monastery of the Capuchin Order, while the convent of the Sisters of Mercy of St. Joseph is attached to St. Patrick's Church. The cemeteries are Rose Hill and Saints Peter and Paul's, beautifully located on the brow of the hill on the western part, Greenmount, Sumner (colored), St. Patrick's and a Jewish cemetery in the eastern part of the city.

One of Cumberland's handsomest buildings, the court-house, was destroyed by fire on the early morning of January 5, 1893. It will be rebuilt, enlarged and improved during the present summer. Immediately in the rear of the court-house site, on the opposite side of the street, is the county jail, a well-protected and strongly built piece of brick work. Within a stone's throw of the jail are located the city water works, between Green street and the river. Just at the eastern limits of the city are the Alms-house and Sylvan Retreat, an asylum for the insane, built by the county in 1888, at a cost of thirty-five hundred dollars. On Baltimore avenue there is the Western Maryland Home and Infirmary. This charitable undertaking was organized in 1887 by a few

of Cumberland's philanthropic ladies. State aid was obtained, and the present perfectly appointed hospital erected at a cost of twenty thousand dollars.

The industries of Cumberland have been treated in another chapter, and a visit to any one of these will well repay the visitor. The cement quarries, the steel mills and glass factories are, perhaps, of particular interest.

### HAGERSTOWN.

Hagerstown, the county seat of Washington county, is picturesquely situated upon the crest of the main watershed of the Cumberland valley, with the historic Antietam one mile east and the Conococheague six miles west. It is nearly at the middle of the valley, which here is about twenty miles wide, and is equidistant from Pennsylvania and West Virginia. At an elevation of 600 feet above sea level, its broken and rolling site has adequate surface drainage and is exceptionally healthy. The geological formation of the region is Lower Silurian, the Trenton limestone being the surface rock, with mountain sandstone flanking at the foot-hills on either side. It is at the centre of one of the richest agricultural sections of the continent, and from the hill-sides and higher buildings the eye takes in, to the east and west, bounded only by "South" Mountain on the east and "North" Mountain on the west, a grand panorama of the valley, twenty miles or more in width. To the north and south extends a stretch of more than sixty miles of thickly-settled, abundantly-watered, highly-cultivated farm lands, the homes of thrift, happiness and peace, while at either extremity lie the great battle-fields of Antietam and Gettysburg.

The city was founded in 1762, by Jonathan Hager, whose name it bears. In making its plan, he wisely provided wide and regular streets, and spacious town lots, so that, in the older parts of the city, an absence of the crowding so often seen in American cities is noticeable.

The history of Hagerstown before 1860 is that of most county seats in agricultural sections, one of slow, steady growth from within, yet so substantial as to lay broadly the foundation for large things in the future. Upon the great highway, the National road, from Washington westward, its wayside inns were of wide repute in stage coach days. The road system of the county early received attention, and the abundance of limestone facilitated the making of excellent Macadam roads. At the present time eleven of these radiate to all the lesser towns, affording ample facilities for access, and with admirable railroad facilities, concentrating in this city the larger part of the traffic of the county and the adjoining parts of the valley, both north and south. Being one of the strategic points of the late war, it early came to share the fortunes of

the borderland, and its occupation by the forces of one of the other of the contending armies, was almost constant. This was not, however, an unmixed evil, since it attracted some measure of attention to the advantages of its location for business, manufacture and residence. Its real development began about 1870, at which date its population was less than 5,000. Since then its growth has been steady in measure, substantial in character and encouraging in stability and diversity. Its population in 1890 was 11,698, an increase in the decade of over 52 per cent. The estimated present rate of increase is over 7 per cent. per annum, making the population at the beginning of the year 1893 at least 13,000. This estimate is fully warranted by the annual increase for some years past of over 225 dwellings. The fact is also significant that houses are built to meet actual needs, and are in large part erected by wage-earners for their own occupation.

Hagerstown has twenty-one churches, of which twenty are Protestant, representing eleven denominations, the Lutheran predominating, three colored and one Catholic. All have fine edifices, and a number very beautiful church buildings. It has also five public school buildings, accommodating thirty-nine graded public schools, five private schools, one young ladies' seminary having over two hundred students, and a commodious and elegant municipal building, with ample public market accommodations. Its hotels are greatly superior to those of any town of its size in the East. They are ten in number, furnishing accommodations for one thousand persons, and actually accommodating an annual average of forty-five thousand persons. The two principal ones cost over $125,000 each, and are models of elegance and comfort, heated throughout by steam, lighted with electricity, with elevators and all modern conveniences. so complete in their accommodations as to be noted and especially attractive to travelers. The entire city is amply lighted by electricity, its dwellings and business houses by electricity and gas. With its graded and paved sidewalks, wide, macadamized streets, its law-abiding population (the entire and efficient police force consisting of a chief and three roundsmen), Hagerstown is a model town. Its ample water supply of pure, soft sandstone water, is drawn from mountain streams eight miles away, and two hundred and fifty feet above mean level, giving an average hydrant pressure of eighty-five pounds at the highest point of service, and so making almost unnecessary the volunteer fire department, which includes two first-class steam-engines, two hand-engines and ample hook-and-ladder and hose apparatus.

Its municipal government is now conducted by a Mayor and Council. All street maintenance and extension are under the direction of an unpaid street commission. All public needs and expenditures are met by an annual tax of five mills, and this, with the State and county tax,

amount to but fourteen and one-half mills. Property is assessed at an average of about three-fourths of its estimated market value. The limitation by charter of the maximum corporate tax, and of public expenditures in each year to the amount of tax specifically levied, with the inhibition of the creation of debt without previous legislative authority and popular approval by vote, effectually guards the city against extravagance in municipal expenditures.

### FREDERICK.

Frederick, the county seat of Frederick county, is a beautiful town, nestling among Maryland hills upon the banks of Carroll Creek. It was laid out by Patrick Dulany in 1745, and the first house was built by John Thomas Schley on what is now East Patrick street. Here Washington and Benjamin Franklin met for the first time, and here also Washington and Braddock fitted out their famous expedition against the French and Indians in 1755. The barracks in which the troops were quartered, and the military road built by them and over which they marched, are still in a good state of preservation. Before the Baltimore and Ohio Railroad was built, all the travel and traffic to and from the West came over the National road, which passes through the city. Such distinguished statesmen and public men as Henry Clay, General Andrew Jackson, President William Henry Harrison and General Winfield Scott were entertained by its citizens, while the older inhabitants of the generation that has just passed away, delighted to relate their recollections of the visit of the Marquis De Lafayette and the ball given in his honor in this city.

Frederick is well laid out with wide streets intersecting each other at right angles, paved with stones and lighted with electricity. The houses are substantially built, and though some are old-fashioned and quaint in style of architecture, many are modern and handsome, equalling those of any other city of its size. The public buildings, including the court-house, market-house, public halls, churches, schools, banks and the State institution for the deaf and dumb, are modern and well built. The stores are numerous and well furnished with articles in their various lines. Markets are abundantly supplied with the necessaries and comforts of living, at reasonable prices. The city has, just beyond its limits, a large reservoir supplied with an abundance of pure, fresh water, brought in pipes from springs in the mountains, in sufficient quantity for all domestic and manufacturing purposes and for the needs of an efficient volunteer fire department.

The fertile lands, the admirable location, the low cost of living, the salubrity and beauty of its site, the energy, thrift and prosperity of its population, all combine to make Frederick a highly attractive city.

## TOWNS.

*Cambridge*, the county seat of Dorchester county, is the largest town on the Eastern Shore. It is finely situated on the south bank of the Choptank River, about eighteen miles from its mouth, which at this point is between two and three miles wide. The town is divided unequally by a branch of the river into east Cambridge and the main town, and possesses a fine harbor for vessels of all descriptions. The streets are, as a general rule, wide and well shaded by trees, while the whole is beautified by flower gardens and grass plots in front of many of the dwellings. The houses are, generally, of the cottage type, so characteristic of Eastern Shore towns; but many substantial brick buildings have recently been erected in the business section. The town is well lighted by gas, and will soon be provided with a system of artesian water supply. It is amply protected from fire by a volunteer fire department. Educational advantages are afforded by an excellent system of public schools, including a high school, partly supported by the State. There are eight churches, six white and two colored, representing as many different denominations.

*Frostburg* is the second largest town in Allegany county. It is situated on a plateau of the Allegany Range seventeen hundred feet above sea level. It is in the midst of a great coal region, midway between Cumberland and Piedmont, on the line of the Cumberland and Pennsylvania Railroad. The population of the town is composed for the most part of miners of foreign extraction, but of thrifty and law-abiding habits. The town is governed by a Mayor and a board of six Councilmen; it is lighted by gas and well provided with well water. It contains fourteen churches, several public schools and two newspapers. The vicinity of Frostburg is notable for the beauty and sublimity of its natural scenery. The view afforded from the town itself into Pennsylvania, Maryland and West Virginia is most impressive.

*Havre de Grace* is pleasantly situated on the south bank of the Susquehanna River near its mouth. It is one of the oldest towns in the State, and received its name from a fancied resemblance to the site and environment of the French port. The city is governed by a board of five commissioners elected annually. It is attractively laid out with wide streets, lined by well-built houses. A system of public schools for white and colored children, and a number of churches provide for the needs of the inhabitants. The industrial activity of the town largely centres, as has been stated, about its fisheries and ice trade. Havre de Grace has admirable railroad connection with the larger cities, being about midway between Baltimore and Philadelphia. It is located in the midst of a rich agricultural country, with an almost inexhaustible supply of fish and fowl at its very door. Living is cheap, the climate is

healthy, and it offers many attractions as a place of permanent or transient residence.

*Easton*, the county seat of Talbot county, has grown up around the court house, which was built, somewhat more than one hundred years ago, in an "old field near Pitts his bridge." The court house, a well-proportioned Colonial building, is still the most prominent feature of the town, standing with the jail and armory, on a shaded green. Near it are the market house and town hall, and the Odd Fellows' hall. The town is regularly laid out, well lighted with electricity and gas, and supplied with abundant water from artesian wells. It is still primarily a shire town, the capital of a wealthy and populous county. On any "public day" the streets are crowded with vehicles of every description, while the market house and "space" are full of people buying, selling and discussing business or county affairs. The Talbot county fair is held here every fall, the exhibits being displayed in a series of fine buildings owned by the Fair Association. Easton has a militia company of about forty men, and an efficient fire company. The important religious denominations are represented by well built churches. The most interesting of these structures is, perhaps, the Friends' meeting house, erected over two hundred years, and standing in a grove of great oaks, just outside the town. Both Fox and Penn worshipped here. Four newspapers are published in the town, and well organized public schools are in operation.

*Salisbury*, the county town of Wicomico county, and the second largest town on the Eastern Shore of Maryland, is situated on the Wicomico river, ninety-five miles from Annapolis. In its present form the town dates practically from a disastrous fire, occurring several years ago. In the work of reconstruction, the main street was widened and straightened, and brick buildings generally substituted for the earlier frame structures. As a result, the town presents a modern appearance unusual in towns of larger size. Salisbury has several banks, a number of churches, and a volunteer fire department. Its public schools are well equipped, graduates of the high school being prepared to enter a collegiate sophomore year. Two newspapers are published in the town. The climate of Salisbury is pleasant and healthful, and the surrounding country is rich and productive. Its industrial activity centres largely in the lumber trade.

*Westminster*, the county seat of Carroll county, is situated at the head-waters of the Patapsco, midway between Baltimore and Hagerstown, on the line of the Western Maryland Railroad. It was founded as early as 1766 and incorporated as a town seventy years later. It is situated in the midst of a rich and productive country, and has ample water power for industrial establishments. Fine grades of marble are quarried in the

vicinity. Westminster is the site of Western Maryland College, a co-educational institution under the control of the Maryland Conference of the Methodist Protestant Church. The town contains several fine structures, and bears the general appearance of a substantial, prosperous community.

*Chestertown*, the county town of Kent county, was incorporated in 1706, and early became a port of entry for the Province. The original custom-house and counting-room, though since converted into dwellings, can still be pointed out. The town is well laid off, the streets being wide and straight, and lined on either side with historic shade trees. The court-house and jail are spacious modern structures, as are many of the private residences. Chestertown is the site of Washington College, which was established in 1782, and was visited by Washington himself two years later. Five churches of as many different denominations, two banks and a series of public schools are located in the town. It is sixty miles distant from Baltimore by water, and ninety miles by rail. Steamers from Baltimore arrive daily.

*Elkton*, the county seat of Cecil county, is advantageously located at the head of Elk river, a tributary of the Chesapeake. The town is also half way between Philadelphia and Baltimore on the Philadelphia, Wilmington and Baltimore Railroad. The public buildings consist of a court-house, recently rebuilt, with fire-proof offices for the county archives, a handsome town council hall, part of which is occupied by a well equipped local fire company; and seven church edifices, all excellently maintained. The town is supplied with both gas and electric light. Water has recently been introduced through a modern reservoir and gravity system, affording a constant supply of pure and soft water for domestic and municipal uses. The educational facilities of the town embrace an academy of high grade, a grammar school and public schools for white and colored children. Ample facilities are afforded for public entertainments, and a free circulating library will soon be provided. Two national banks afford all needed banking facilities, and the retail trade of the town is transacted by enterprising mercantile establishments. Elkton is the centre of a refined and cultivated population, with every inducement for permanent residence, and many attractions for summer sojourn.

*Catonsville* is on the Frederick road, six miles from Baltimore, with which it is connected both by railroad and street railways. It is well provided with churches and schools, and is the site of the Spring Grove Insane Asylum. Its pleasant location, healthy environment and proximity to Baltimore have made it a growing suburb of that city.

*Sparrow's Point* is the site of the works of the Maryland Steel Company, and has been described in another connection.

## PUBLIC BUILDINGS.

*State House.* The first colonial capital of Maryland was St. Mary's, in the southern part of the Province, but the seat of government was removed in 1694 to Annapolis, where the first state house was built upon the site of the present building. This being destroyed by fire in 1704, a larger capitol was erected, but this again, after fifty years' occupation, proving too small for the increased needs of the community, was torn down in 1769, and replaced by the present structure. The plans are supposed to have been drawn by a pupil of Sir Christopher Wren. The dimensions are: height to the top of the dome, 200 feet; front, 120 feet; depth, 175 feet.

The visitor enters by the south door into a rotunda of imposing effect, beneath the dome. To the right of the entrance is the Senate chamber, and that of the Delegates on the left.

The Senate chamber has been the scene of memorable events in the country's history. Here, on December 23, 1783, Washington surrendered to Congress his commission as Commander-in-Chief of the armies of the United States. In this chamber, in 1784, the long struggle for American independence was brought to a close by the ratification, in the presence of Congress, of the treaty of peace with Great Britain. Here, in September, 1786, the first Constitutional Convention, generally known as the Annapolis Convention, met to frame a better form of government for the United States.

This apartment, measuring thirty feet by forty, has been enlarged and embellished in the last few years. On the west wall is a painting representing Washington resigning his commission, and on the opposite side is the famous portrait of Washington by Gilbert Stuart. Other portraits of distinguished Marylanders, and many curious and interesting historical relics, adorn the walls of this and the antechamber.

In the Delegates' chamber is a fine painting by Peale, representing the surrender of Cornwallis at Yorktown.

The State Library, containing about 70,000 volumes, and the Judicial and Executive Departments are on the second floor. In the Governor's room is a fine portrait of George Calvert, first Lord Baltimore, copied from the original by Mytens, and presented to the State by the late John W. Garrett, Esq. Here too are portraits of several early governors of the State.

From the balcony above the dome, at the height of one hundred and eighty-five feet, a magnificent view is obtained; the city of Annapolis with its harbor, the Severn river, the Chesapeake bay, and the picturesque surrounding country, spreading like a panorama before the eye.

Two fine bronze statues of colossal proportions adorn the grounds. One, representing Roger Brooke Taney, Chief Justice of the United States,

is the work of W. H. Rinehart, a distinguished Maryland sculptor, and was erected by the State in 1872. The other, representing Baron DeKalb, leading the Maryland and Delaware troops at the battle of Camden, where that hero fell, mortally wounded, was erected by the United States in 1886, in pursuance of a resolution of Congress passed in 1780. This spirited work is by Ephraim Keyser, also a Maryland artist.

*Executive Mansion.* The official residence of the Governors of Maryland for one hundred years before 1866, was the building now used as the library of the Naval Academy, having been purchased by the Federal Government in the year last named. In the same year, during the administration of Governor Swann, the present Executive Mansion was built.

*State Treasury, &c.* Upon the State-house hill, to the right of the State-house, stands a quaint old colonial building of very modest proportions. This is the Treasury of the State of Maryland. The building is in the shape of a Greek cross, and is probably the oldest edifice in the city. The venerable college poplar is the single living witness of its building, nearly two hundred years ago. The rooms are low, and the walls of unusual solidity and thickness, capable of bidding defiance to the limited resources of colonial burglars. Near it stands a modern building containing the Land Office and other public offices.

# CHAPTER XII.

## POLITICAL INSTITUTIONS.

**The political evolution of Maryland from the struggling palatinate of the seventeenth century to the sovereign State of our own day, has been traced in an earlier part of this volume. The purpose of the following pages is to describe the present government and existent political institutions of the State.**

### GOVERNMENT.

***Constitution.* The present Constitution of Maryland was formed by a convention assembled in Annapolis in May, 1867, and was ratified by popular vote in the following September. It is the fourth Constitution adopted in the history of the State, earlier instruments bearing date of** 1864, 1851 and 1776. It is preceded by a Declaration of Rights, containing forty-five articles, asserting the usual rights of trial by jury, freedom of speech, religious liberty, taxation according to actual worth, with declarations against retrospective and sanguinary laws, attainder, monopolies, trial by martial law, etc. The Constitution proper consists of fifteen articles, treating of elective franchise, executive department, legislative department, judiciary department, Attorney General and State's Attorneys, Treasury department, sundry officers (County Commissioners, Surveyors, State Librarian, Commissioner of the Land Office), education, militia and military affairs, labor and agriculture, public works, new counties, amendments, miscellaneous matters and vote on the Constitution.

*Administration.* The government of Maryland follows the general theory of American political organization in a fundamental separation of departments. This is specifically provided in Article 8, of the Declaration of Rights, which asserts that "the legislative, executive and judicial powers of government ought to be forever separate and distinct from each other." For purposes of administration the State is divided into twenty-three counties, and the city of Baltimore, which is not comprised within the limits of any county. The local affairs of each county are regulated by a board of County Commissioners, elected by popular vote, but determined in number and term of office by special acts

STATE HOUSE, ANNAPOLIS MD

of the General Assembly. There is no general administrative subdivision of counties into townships, but school and election districts exist for the purposes indicated. The government of Baltimore is vested in a Mayor and City Council.* The local affairs of other minor civil divisions, cities, towns and villages, are variously controlled by a Mayor and Council, by a Burgess or President and Board of Commissioners, or by a Board of Commissioners alone. The manner of election and range of powers of these authorities are in each case defined by legislative charters, and by special acts of the legislature, passed from time to time.

*Executive.* The executive power of the State is vested in a Governor, elected for a term of four years and receiving an annual salary of $4,500. He must have attained the age of thirty years, and must have been for ten years a citizen of Maryland, and for five years next preceding his election a resident of the State. He is the commander-in-chief of the land and naval forces of the State, may call out the militia to suppress insurrections, repel invasions and enforce the execution of the laws, but can not take the command in person without the consent of the legislature. All legislative enactments must be submitted to his consideration, and his veto can be overruled only by a three-fifths vote of both houses.

He has the usual power to grant reprieves and pardons and to remit fines and forfeitures to the State. He appoints, by and with the consent of the Senate, all civil and military officers of the State, whose election is not otherwise provided for, and is vested with general authority to secure the faithful execution of all laws.

The Governor, upon election, appoints a Secretary of State, who continues in office during the gubernatorial term, and receives an annual salary of two thousand dollars. He keeps and preserves a careful record of all official acts and proceedings, and performs such other duties as are prescribed by law, or as properly belong to his office.

*Legislative.* The legislative department consists of two distinct branches, a Senate and a House of Delegates, together styled the General Assembly of Maryland. Each county in the State, and each of the three legislative districts of Baltimore, is entitled to one Senator elected for a term of four years. The apportionment of representation in the House of Delegates is made upon the following basis: Counties having a population of eighteen thousand persons or less are entitled to two delegates; those between eighteen thousand and twenty-eight thousand, to three delegates; between twenty-eight thousand and forty thousand, to four delegates; between forty thousand and fifty-five thousand, five delegates; and fifty-five thousand or more, six delegates. Each of the

* For a more detailed account of the government of Baltimore, see page 381.

legislative districts of Baltimore city is entitled to as many delegates as the largest county—six.

No person is eligible as Senator until he has reached the age of twenty-five years, nor as Delegate until he has reached legal majority, nor to either office unless he has been a resident of Maryland for at least three years, and of the particular county or legislative district which he may be chosen to represent, for one year. The members of both bodies receive a compensation of five dollars *per diem* for actual service.

The General Assembly meets biennially, and as the first Legislature under the Constitution of 1867 met in 1868, sessions always fall in even years. It convenes on the first Wednesday of January and continues in session for a period fixed by a constitutional limitation as not longer than ninety days. A special session may be convened by proclamation of the Governor, but may not sit longer than thirty days.

*Judicial.* The judicial powers of the State are vested in a Court of Appeals, Circuit Courts, Orphans' Courts, Baltimore City Courts and Justices of the Peace. All judges, except those of the Orphans' Courts, are elected by popular vote for a term of fifteen years and are selected from those who have been admitted to practice law in the State, and who are "most distinguished for integrity, wisdom and sound legal knowledge" (Const. of Md., Art IV., Sect. 2). The State is divided into eight judicial circuits, in the following manner: Worcester, Somerset, Wicomico and Dorchester counties, first; Caroline, Talbot, Queen Anne, Kent and Cecil, second; Baltimore and Harford, third; Allegany, Washington and Garrett, fourth; Carroll, Howard and Anne Arundel, fifth; Montgomery and Frederick, sixth; Prince George's, Charles, Calvert, St. Mary's, seventh; Baltimore city, eighth.

For each of the first seven of the above circuits, a chief judge and two associate judges are elected, who hold a Circuit Court of not less than two terms in each county. A clerk of the Circuit Court is elected by popular vote in every county for a term of six years. The salary of the chief judge is fixed at $4,500 per year, and that of an associate judge at $3,600.

The judiciary of Baltimore consists of a chief judge and four associate judges, together styled the Supreme Bench of Baltimore City. The judges are elected for a term of fifteen years, and are assigned to the following courts: Superior Court, Court of Common Pleas, Baltimore City Court, Criminal Court, Circuit Court and Circuit Court No. 2, the two latter being courts of equity.

The Court of Appeals is composed of the chief judges of the first seven of the judicial circuits of the State, and a judge from the city of Baltimore specially elected thereto. The Governor designates one of this body by and with the consent of the Senate, as chief judge. A clerk

of the Court of Appeals is elected by popular vote for a term of six years, and the sessions of the court are held in Annapolis.

An Orphans' Court is located in each county of the State and in Baltimore city. It consists of three judges elected by popular vote for a term of four years, and exercises the functions of a Probate Court. A Register of Wills is similarly elected for a term of six years. He is eligible for re-election and subject to judicial removal for cause.

Justices of the peace are appointed in the several counties by the Governor, and have jurisdiction in civil suits where the amount involved does not exceed one hundred dollars. Constables are appointed by the County Commissioners and by the Mayor and City Council of Baltimore for a term of two years, subject to judicial removal for incompetency or neglect of duty. A sheriff is elected in each county and in the city of Baltimore every second year. Coroners and notaries public are appointed by the Governor.

*Legal.* The legal functions of the State are entrusted to an Attorney-General, elected by the voters for a term of four years, and receiving an annual salary of three thousand dollars. He must have resided and practiced law in the State for at least ten years before his election. He is charged with the prosecution and defense on the part of the State of all cases pending in the Court of Appeals, or in the United States Supreme Court. He is required to give his opinion in writing, whenever required by any public officer, upon any legal matter pending before him, and cannot receive any fees or perquisite in addition to the salary paid for the performance of his official duty.

A State's Attorney is elected by popular vote in each county and in the city of Baltimore for a term of four years, and serves as the prosecuting officer of the State in the particular district. He must have been admitted to practice law in the State, and have resided at least two years in the county or city in which he may be elected.

## FINANCES.

The finances of the State are administered by a Treasury Department, consisting of a Comptroller, chosen biennially by popular vote, with an annual salary of twenty-five hundred dollars, and a Treasurer, appointed by the General Assembly at the same salary. The Comptroller is vested with a general superintendence of the fiscal affairs of the State. He prepares and reports estimates of revenue and expenditure; enforces the prompt collection of all taxes; preserves all public accounts, and grants all warrants for money to be paid out of the treasury in pursuance of appropriations by law. The Treasurer receives and deposits the moneys of the State, and disburses the same upon warrants

drawn by the Comptroller. He provides for the payment of the interest of the State debt, and for purchases on account of the sinking fund.

*Funded Debt.* The net funded debt of Maryland aggregated on September 30, 1892, $3,082,286.35. The original loans, which have all been re-funded at 3 and 3$\frac{65}{100}$ per cent., were issued to aid in the construction of works of internal improvement, largely the Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad; for the erection of State institutions, and to assist in the public defence during the late war. The volume of indebtedness is being rapidly reduced—by the amount of $2,036,656.28 in 1892—and will probably be entirely extinguished in a few years. The credit of the State is high, its bonds being sought for purposes of investment, and commanding premiums in the general market. The following is a detailed statement of the funded debt:

| Character of Loan. | Date of Maturity. | Amount. |
|---|---|---|
| 3 per cent. Exchange Loan of 1886 | 1900 | $ 628,355.00 |
| 3$\frac{65}{100}$ per cent. Defence Redemption Loan | 1899 | 3,000,000.00 |
| 3 per cent. Exchange Loan of 1886 | 1901 | 1,270,474.10 |
| 3 per cent. Exchange Loan of 1889 | 1903 | 3,079,400.00 |
| 3 per cent. Exchange Loan of 1891 | 1905 | 706,757.14 |
| Gross amount of Funded Debt | | $8,684,986.24 |

As an offset to this debt, the State holds the following bonds and stocks, on which interest or dividends are paid:

| | |
|---|---|
| Stock in Washington Branch B. & O. R. R. Co. | $ 550,000.00 |
| " Farmer's National Bank of Annapolis | 46,470.00 |
| " Annapolis Water Company | 30,000.00 |
| Bonds of N. C. Railway Mortgage | 1,500,000.00 |
| Bonds of Susquehanna and Tide-Water Canal Co. | 1,000,000.00 |
| Cash to Credit of Sinking Funds | 1,485.46 |
| Stocks and Bonds to Credit of Sinking Funds | 2,474,744.43 |
| | $5,602,699.89 |
| Net debt after productive stocks held by the State and the Sinking Funds are deducted* | $3,082,286.35 |

*Revenues.* Article 14 of the Maryland Declaration of Rights (Art. XV.), declares that "every person in the State or persons holding property therein, ought to contribute his proportion of public taxes for the support of the government according to his actual worth in real and personal property." This is the basis of Maryland taxation. A direct tax is levied upon all real and personal property, for purposes of public education and to provide interest and sinking funds for the funded debt. It is imposed upon individual and corporate property, and upon the

* "It is worthy of note that the productive stocks, with a single exception, held by the State, have a market value greatly in excess of their par value, and if a statement was prepared placing the State securities at their market value, this net debt would be decreased by more than one-half." (Report of Comptroller for 1892, p. vi).

capital stock of corporations, less the assessed value of parts of its capital already taxed or non-taxable. Personal property is listed by the statement of the taxable, and valued by the assessor. The last general assessment was made in 1876. Revisions are, however, made from year to year by the county boards and by the Appeal Tax Court of Baltimore City. A Tax Commissioner is apointed by the Board of Public Works for a term of four years, at an annual salary of twenty-five hundred dollars, to assess and revise for State purposes the shares of all incorporated associations or institutions liable to taxation.

The assessed value of property in 1877—in which year the returns of the general assessment became first available—in 1891 and in 1892, and the amount realized in 1892, are as follows:

| Counties and Baltimore City. | Assessed value of property for State levy in 1877. | Assessed value of property for State levy in 1891. | Assessed value of property for State levy in 1892. | Amount of levy for 1892 at 17¾ cents on each $100.00. |
|---|---|---|---|---|
| Allegany | $ 10,809,342 | $ 16,082,934 | $ 16,151,558 | $ 28,669 01 |
| Anne Arundel | 9,870,117 | 10,725,314 | 10,874,049 | 19,301 44 |
| Baltimore City | 243,132,007 | 276,408,052 | 277,171,612 | 491,979 61 |
| Baltimore County | 50,501,160 | 39,650,644 | 41,359,723 | 73,413 50 |
| Calvert | 2,113,559 | 2,037,800 | 2,033,209 | 3,608 95 |
| Caroline | 3,757,157 | 4,381,469 | 4,351,415 | 7,723 74 |
| Carroll | 16,167,511 | 15,885,655 | 15,877,537 | 28,182 62 |
| Cecil | 13,198,535 | 13,389,101 | 13,271,949 | 23,557 70 |
| Charles | 3,452,501 | 3,322,016 | 3,410,140 | 6,052 98 |
| Dorchester | 6,029,790 | 6,183,618 | 6,193,888 | 10,994 15 |
| Frederick | 25,462,716 | 23,139,041 | 23,613,030 | 41,913 13 |
| Garrett | 3,336,359 | 4,124,187 | 4,261,610 | 7,564 36 |
| Harford | 11,506,902 | 12,137,415 | 12,444,104 | 22,088 27 |
| Howard | 7,526,408 | 7,436,312 | 7,515,094 | 13,339 29 |
| Kent | 7,448,301 | 7,759,640 | 7,783,728 | 13,816 11 |
| Montgomery | 8,272,571 | 9,951,605 | 10,425,220 | 18,504 76 |
| Prince George's | 9,073,363 | 9,005,217 | 9,138,883 | 16,221 52 |
| Queen Anne's | 6,585,383 | 7,230,844 | 7,544,416 | 13,391 34 |
| St. Mary's | 2,918,698 | 2,831,924 | 2,718,126 | 4,824 67 |
| Somerset | 3,939,349 | 4,088,342 | 4,193,568 | 7,443 57 |
| Talbot | 8,107,149 | 8,634,056 | 8,698,294 | 15,439 46 |
| Washington | 16,599,731 | 17,055,413 | 17,351,775 | 30,799 40 |
| Wicomico | 4,479,301 | 4,065,605 | 4,149,119 | 7,364 68 |
| Worcester | 4,180,118 | 4,477,273 | 4,605,481 | 8,174 72 |
| Totals | $478,468,028 | $510,003,077 | $515,137,528 | $914,368 98 |

RECAPITULATION FOR 1892.

| | |
|---|---|
| Amount of levy for public school tax, at 10½ cents on each $100 | $540,894 32 |
| Amount of levy for defence redemption tax, at 5½ cents on each $100 | 283,325 60 |
| Amount of levy for treasury relief tax, at 1½ cents on each $100 | 77,270 62 |
| Amount of levy for exchange loan of 1886 tax, at ¼ cent on each $100 | 12,878 44 |
| Total | $914,368 98 |

The rate of the State tax for each year since 1876 is as follows:

| | |
|---|---|
| 1877 | 17½ per cent. |
| 1878 to 1887 | 18¾ per cent. |
| 1888 to 1892 | 17¾ per cent. |

Sources of revenue other than this general property tax, are the sale of traders' and other licenses, a bonus or franchise tax of one-eighth of

one per cent. upon the capital stock of all newly created corporations, a franchise tax upon the deposits of saving institutions, a part of which accrues to the locality where the institution is located; a tax of one-half of one per cent. upon the gross receipts of electric light and electric construction companies; of one per cent. upon the gross receipts of railroad corporations; and of a designated per cent. of the gross receipts of other specified corporations. A State tax is also imposed on collateral inheritances, and on commissions of executors and administrators. The excess of fees of public officers and the liquor license in Baltimore City constitute other sources of revenue.

*Receipts.* The total receipts in the State Treasury for the fiscal year ended September 30, 1892, were $3,006,551.18. Of this aggregate the important items were as follows:

| | |
|---|---|
| Direct tax upon persons and incorporated institutions.. | $909,770 19 |
| High Liquor License for Baltimore city.. . .......... | *507,086 87 |
| Trader's License ... ........ ......... ........ .. | 189,764 58 |
| Foreign insurance companies........ ................. | 118,601 88 |
| Tax on gross receipts of corporations... . ........... | 188,016 84 |
| " " collateral inheritances ... ...... . .... ...... | 114,009 21 |
| " " executors' commissions.... .................... | 58,458 40 |
| Interest on invested Sinking Fund. . ... ............ | 171,514 65 |
| Exchange Loan of 1891................................ | 100,000 00 |
| Direct tax of 1861 from United States Government..... | 371,899 88 |

*Expenditures.* The total disbursements from the State Treasury during the fiscal year ended September 30, 1892, were $3,065,833.02. The principal items of expenditures were the following:

| | |
|---|---|
| Public Debt, interest.................................. | $323,596 39 |
| " " Sinking Fund...... ...... .............. | 404,387 58 |
| State Stock, for redemption..... .... ... ............ | 406,012 76 |
| Judiciary.................................... .......... | 100,992 28 |
| Legislative................ ... ....... ....... ..... | 122,829 49 |
| Public schools, white and colored.... ...... ......... | 560,512 86 |
| Charitable, Reformatory and Penal Institutions ... ... | 237,430 00 |
| Colleges and academies.................. .......... | 67,317 29 |

## PUBLIC DEPARTMENTS.

*Board of Public Works.* The Governor of the State, the Comptroller of the Treasury and the State Treasurer constitute the Board of Public Works. Their duties are generally defined in Article XII of the Constitution of Maryland, as "a diligent and faithful supervision of all public works in which the State may be interested as stockholder or creditor." At the present time this consists in the appointment of directors for the Chesapeake and Ohio Canal, the Washington Branch of the Baltimore and Ohio Railroad, and various other corporations in which

*Of this amount, $280,469.79 was returned as required by law to Baltimore City.

the State is, to a less degree, interested. The Board of Public Works also appoints, as will be seen hereafter, the officers of the State Fishery Force, together with certain special officers, such as the Tax Commissioner and the Insurance Commissioner.

*Militia.* The history of the militia of Maryland is throughout a record of unflinching bravery in war and of timely service in riot and disorder. The close of the Revolutionary War found the State with five full regiments in the field. Many of them were converted into militia companies of one kind or another, which the Whiskey Insurrection, the threatened difficulties with France, and the imminent outbreak with England kept alive and strong. A large force of well-equipped volunteers fought in the war of 1812, and during the Civil War, no class responded more promptly or served more gallantly than did the citizen soldiers of Maryland. Since the war the militia has rendered excellent service in the preservation of order. During the railroad strikes of 1877 the Fifth Regiment, together with the Sixth, was called upon at an unexpected time to assist in maintaining law and order, and discharged its duty creditably under the most trying circumstances. Subsequent activity has been characterized by the same spirit. Animated by the same spirit and remarkable for its rapid development is the Fourth Regiment, the nucleus of which, the Baltimore Light Infantry, was organized in the winter of 1885.

The Maryland National Guard was reorganized in its present form by an act of the Maryland Legislature passed in 1886, providing for a State military force of not more than two thousand two hundred and eighty men, formed in one brigade. At present the command is composed of the following organizations:

First Regiment Infantry, nine companies, consisting of Frederick Rifles, Hagerstown Light Infantry, Linganore Guards, Jackson Guards, Governor's Guards, Waverley Guards, Towson Guards and Howard Zouaves.

Fourth Regiment Infantry (Baltimore), nine companies, of sixty men each, with fifty-two officers, making the total strength of the regiment about six hundred men.

Fifth Regiment Infantry (Baltimore), twelve companies of sixty men each, with sixty officers. The band of the regiment numbers seventy-five musicians. A Veteran Corps, consisting of three companies, with a full strength of one hundred and fifty men, maintains fellowship among ex-members of the regiment.

Second Battalion Infantry, four companies, consisting of Voltigeurs (Cumberland), Garrett Guards (Oakland), and Hamilton Light Infantry (Frostburg).

Third Battalion Infantry, five companies, consisting of Groome Guards, Prince George's Rifles, Talbot County Guards, Lloyd Guards and Calvert County Company.

Monumental City Guards (Baltimore), independent colored company.

Baltimore Rifles (Baltimore), independent colored company.

Alleghany County Guards (Cumberland), independent colored company.

*Fishery Force.* The Maryland State Fishery Force consists of two steamers, nine schooners and two sloops, armed and equipped as a naval militia to enforce the oyster fishery laws of the State. Eight local boats are paid by the counties to watch the waters within their jurisdiction, but are under the control of the State navy. The movements of the force are directed by a commander appointed, as are all the subordinate officers, by the Board of Public Works. Each of the steamers is controlled by a deputy commander, and each of the schooners and sloops by a captain. The territories protected by the local boats are Poplar Island Narrows, Cambridge, Herring Bay, Holland Straits, St. Mary's River, St. Michael's and Oxford. The *Governor McLane* is the flagship of the navy. The outfit of the regular boats, as distinguished from the local boats, consists of Winchester rifles and one cannon each. The steamers have each a crew of twelve men, and the schooners and sloops each of six. The local boats, which are only employed for six months of the year, have each a crew of four men. They carry no cannon, but are armed with Winchester rifles.

*Tobacco Inspector.* From early provincial days, measures have been taken in Maryland to maintain a high standard of excellence in the production of its chief staple. The various statutes adopted from time to time were systematized in a Tobacco Code, passed in 1763. It consisted of one hundred and fifty-three sections providing in great detail for the inspection, sampling and shipping of tobacco. This code has since been supplemented and revised at intervals. To facilitate inspection, a number of tobacco warehouses have been erected in Baltimore, the first as early as 1823. At present three are in activity, each under the direction of an inspector, biennially appointed by the Governor at an annual salary of twenty-five hundred dollars, and a subordinate force similarly appointed. The general supervision of the system is entrusted to a Supervisor of Warehouses, appointed for a term of two years at an annual salary of twenty-five hundred dollars.

*Land Office.* A Land Office, distinct from other public departments, was created in Maryland as early as 1680. Its functions were administered by a Land Council, and included the disposition and regulation of all public lands, whether by lease or sale. The Confiscation Act of 1780 vested in the State all lands belonging to the Proprietary and other

British owners. In 1781 a portion of these lands was allotted to Maryland officers and soldiers who had served in the War of Revolution, and a Land Office was created for the Western Shore, and another for the Eastern Shore, under the direction and care of Registers. The two offices were united in 1851 at Annapolis. Subsequent legislation has materially enlarged the character and scope of the department. Its administration is vested in a Commissioner of the Land Office appointed by the Governor for a term of four years and receiving an annual salary of fifteen hundred dollars, together with a commission on the fees of office. He is required to make searches and furnish copies of land patents; to prescribe rules for and regulate the conduct of County Surveyors in making surveys and returning certificates and plats; and to hear and decide upon all caveats which may come before him as Commissioner.

*Bureau of Statistics and Information.* A Bureau of Industrial Statistics and Information was established in Maryland in 1884, and biennial reports published upon the industrial and social condition of the State. In 1892 the Bureau was reorganized and its scope largely extended. As now constituted, the department is in charge of a Chief of the Industrial Bureau, appointed by the Governor for a term of two years, at an annual salary of $2,500. The work of the Bureau includes the collection of information and statistical data concerning the condition of labor, the agricultural and mineral products of the State, and the traffic of railroads and transportation companies, and of shipping and commerce. The information so gathered is collated and published in an annual report. The Bureau is located in Baltimore at the southwest corner of Charles and Saratoga streets, and it is here that all inquiries suggested by and unanswered in the present volume should be addressed.

*Maryland State Weather Bureau.* A Bureau for the reception of meteorological reports and the display of warning signals for the States of Maryland and Delaware, was organized in May, 1891, under the joint auspices of the Johns Hopkins University, the Maryland Agricultural College and the United States Weather Bureau. The service occupies quarters in the Physical Laboratory of the Johns Hopkins University, on Monument street and Linden avenue, with Dr. C. P. Cronk, of the United States Weather Bureau, as meteorologist in charge. Sub-stations are located in all the counties of Maryland, and also in Delaware, from which reports are regularly received and where warning signals are displayed.

*State Board of Education.* The general care and supervision of public education in Maryland is vested in a State Board of Education, consisting of four persons, appointed by the Governor at every regular session of the General Assembly and serving without salary, the Governor himself and the principal of the State Normal School. They exercise general supervision over Boards of County School Commissioners,

examine candidates, when requested, for the office of County Examiners, and issue professional certificates to teachers. They are *ex-officio* trustees of the State Normal School, and are vested with its general administration and control. Each Board of County School Commissioners and all schools and colleges receiving State appropriations are required to make to them an annual report of all matters affecting educational interests in the county. County Boards are also requested to submit a statement of receipts, disbursements and indebtedness. An abstract of these reports, together with a statement of the apportionment of money to the counties and Baltimore city, and such suggestions regarding the educational interests of the State as are deemed expedient, is submitted in an annual report to the Governor.

*State Board of Health.* This board has general care of the sanitary interests of the people of Maryland. It consists of seven members—three physicians, one civil engineer, a secretary, the attorney-general of the State (*ex-officio*), and the health commissioner of Baltimore (*ex-officio*)—appointed by the Governor for a term of four years, and serving without compensation. The secretary is, however, elected by the board upon organization, and receives an annual salary of eighteen hundred dollars. The functions of the board include a general supervision over the health of the State, investigations into the presence and causes of disease, epidemics and nuisances in specific localities, and the collection of vital statistics.

*Two Boards of Medical Examiners*, consisting of seven physicians each, appointed for a term of four years, and respectively representing the Medical and Chirurgical Faculty of Maryland, and the Maryland Homœopathic Medical Society, examine and license persons qualified to practice medicine in the State.

A *Board of Examiners of Dental Surgery*, composed of the attorney-general, the health commissioner of Baltimore and five practicing dentists, appointed by the Governor for four years, and serving without compensation, examine and issue certificates to all persons practicing dentistry within the State. Three *Commissioners of Pharmacy* are biennially appointed by the Governor upon nomination of the Maryland College of Pharmacy, to license practical pharmacists in the State. A *State Lunacy Commission*, composed of six competent persons appointed by the Governor, and serving without compensation, with the attorney-general as a member *ex-officio*, exercise supervision over all institutions, public and private, in which insane persons are confined. The protection of domestic animals from contagious and infectious diseases is vested in a *Live Stock Sanitary Board*, consisting of three commissioners appointed by the Governor, and receiving a per diem compensation for actual service. Two *Commissioners of Fisheries*, at

an annual salary of fifteen hundred dollars each, have charge of the propagation, culture and preservation of food fishes in the waters of the State. Two *Inspectors of Steam Boilers*, biennially appointed by the Governor at the same salary, inspect, register, and, if necessary, condemn, stationary steam boilers throughout the State.

An *Insurance Commissioner*, appointed by the Board of Public Works for a term of four years at an annual salary of $2,500, issues licenses to insurance companies and maintains the standard of solvency fixed by State law. The interests of the mine labor of the State are entrusted to a *Commissioner of Mines* for Alleghany and Garrett counties, appointed by the Governor at an annual salary of $1,500. He makes periodic investigations of the condition of all mines, sees to the enforcement of all laws relating to mine ventilation, is an inspector of mining scales and weights, investigates all loss of life in mines, and may institute suit if the accident arises from the overseer's violation of law.

A *State Vaccine Agent*, appointed by the Governor for a term of six years at an annual salary of $600, procures and supplies virus to physicians throughout the State.

*Flag and Seal.* The great seal of Maryland has already been described and explained in the Historical Sketch. The flag of the State bears the escutcheon of the seal. This device seems to have been adopted by common consent, as there is no record of the formal adoption of any design as the official flag of the State. That the colony had a distinct flag or standard, we know. The first recorded instance of the use of a Maryland flag occurs in Leonard Calvert's report of the reduction of Kent Island (February, 1638), in which he says that he and his force marched with Baltimore's banner displayed. At the battle of the Severn in 1655, where the supporters of the proprietary government under William Stone, the Governor, were defeated by the Parliamentary party under Captain William Fuller, Stone's forces marched under the flag of Maryland, borne by William Nugent. "standard-bearer of the Province;" while Fuller's party displayed the flag of the Commonwealth, charged with the crosses of St. George and St. Andrew. It is also said that a Maryland flag was carried by the Marylanders who accompanied Braddock's expedition against Fort Du Quesne in 1756.

A Maryland flag was presented at the outbreak of the late war to the Frederick Volunteers, an organization which afterwards became part of the First Maryland Regiment, C. S. A.; and it was carried from the first battle of Manassas, July 21, 1861, to the surrender at Appomattox, April 9, 1865.

It is almost superfluous to add that Marylanders take great pride in their beautiful and historic flag. It forms a part of the stands of colors of the principal militia commands, and is displayed at the City Hall on occasions of public festivity.

*Federal Representation.* Maryland is entitled to elect six representatives to the United States Congress, of whom two are entirely and two partly chosen by the votes of Baltimore city. The composition of the Congressional districts is as follows: 1. Worcester, Somerset, Wicomico, Dorchester, Talbot, Queen Anne's, Caroline and Kent counties. 2. Cecil, Harford, Carroll counties; districts two to twelve of Baltimore county; wards Eleven, precinct No. 9, Twenty-one, Twenty-two of Baltimore city. 3. Wards One, Two, Three, Four, Five, Six, Seven, Fifteen and Sixteen of Baltimore city. 4. Wards Eight, Nine, Ten, Eleven, precincts one to eight inclusive, Twelve, Thirteen, Fourteen, Eighteen, Nineteen of Baltimore city. 5. St. Mary's, Charles, Calvert, Prince George's, Anne Arundel, Howard and Baltimore counties, districts one and thirteen, Baltimore city, ward Seventeen. 6. Alleghany, Garrett, Washington, Frederick, Montgomery counties.

The law provides that of the two United States Senators from Maryland, one shall be chosen from the Eastern, and the other from the Western Shore.

# CHAPTER XIII.

## CHURCHES AND RELIGIOUS INSTITUTIONS.

The history of the many religious organizations now existing in the State of Maryland cannot be written within the compass of a dozen pages, nor can any adequate showing be made of their present activity and boundless possibilities. Scores of volumes have been written upon the past, hundreds of pages of statistics published to show the condition of the present. The present paper, therefore, avoiding detailed statements of past and present, gives only brief synopses of every current phase of religious life within the State. Where the general history of any one denomination becomes closely linked with the State, where important church councils have been held on Maryland soil, this local connection has been brought out; but no attempt has been made to give a connected history. The very complicated system of administrative divisions in the larger denominations has also been explained in so far as it has any connection with our Maryland churches. Nearly one-half the chapter is taken up with describing briefly the many and varied forms of organizations and associations which have grown up under the protecting wing of the churches with the idea of making religion more attractive to certain classes, and thus more effective in its main purpose.

### CHURCH STATISTICS.

The present strength of the various denominations within the State is shown by the accompanying table, which has been compiled from the results of the eleventh census (1890). Nearly a third of the figures are from unpublished tabulations and are here given through the courtesy of Rev. H. K. Carroll, LL.D., special agent of the Census Bureau in charge of the statistics of churches:

The former are always attended by the Bishops of a province; the latter by the whole Hierarchy of the United States. The object of these councils is usually to bring about concerted action in matters of Church discipline. The last Plenary Council was held here in 1884, and was one of the most important ecclesiastical gatherings ever held in America, both in point of numbers and in the results growing out of its deliberations. In 1889 there was convened the first Catholic Congress at which lay members were permitted to take part in the discussion of Catholic affairs. It was attended by prominent laymen from every Diocese.

THE PROTESTANT EPISCOPAL CHURCH.

The Protestant Episcopal Church has the distinction of being the first denomination to be represented within the bounds of Maryland. In 1629, five years before Lord Baltimore's colonists arrived at St. Mary's, services were held at Claiborne's trading-post on Kent Island, by a duly-ordained minister of the Church of England. The Church spread rapidly after the coming of Baltimore's followers, and in 1642, a Jesuit provincial writes that "by far the greater number of the colonists are heretics" (i. e. Episcopalians). From 1688 to 1692 occurred the "Protestant Revolution," which ended in the establishment of the Church of England by act of Assembly in 1692. The territory of the colony was divided into parishes, and a tax, payable in tobacco, voted for the support of the Church. The number of clergymen and communicants steadily increased during the next seventy-five years, but the Church establishments were odious to a majority of the people because of their inefficiency, and because of the general tax for their maintenance. The Revolution seriously threatened the very existence of the Church, and at its close the number of its clergy was found to be reduced one-half. In August, 1783, the remaining clergy met and organized the Diocese of Maryland, which, however, remained without a bishop until 1792, when Bishop Claggett was installed, being the first bishop consecrated by the American episcopate. This convention of 1783 is important because of a historical document called "A Declaration of Certain Fundamental Rights and Liberties of the *Protestant Episcopal* Church of Maryland." According to the late Bishop Whittingham, this is the earliest use of the words which were afterward selected for the title of the Church in America.

The policy of the Episcopal Church has always been to make the limits of the separate dioceses coincide with the State lines, and until the year 1868, the Diocese of Maryland included the whole of Maryland and the whole of the District of Columbia. At that time, however, the Eastern Shore counties were formed into a separate diocese, called the Diocese of Easton. The original diocese is much the larger of the two,

THE CATHEDRAL, BALTIMORE MD

having nearly ten times as many communicants as the Easton diocese. More than one-half of the total number in Maryland are to be found in the city of Baltimore. The Church is also very strong in Anne Arundel, Baltimore, Prince George's and Charles counties. The General Convention has thrice held its triennial sessions in Baltimore. The first occasion was in 1808 and the second in 1871. The former is important because it was the first of the general conventions at which a tendency for closer church union became noticeable, while the latter was held just on the eve of the Low-Church defection, which resulted in the formation of the Reformed Episcopal Church. In 1892 the General Convention again assembled in Baltimore, at Emmanuel Church, and among other things thoroughly revised the liturgy of the Church.

### THE METHODIST CHURCHES.

During the first thirty years in the history of Methodism in America, the State of Maryland was the centre of nearly all of its activity. It was about 1766 that Robert Strawbridge, a Wesleyan local preacher, from Ireland, gathered a small number of people in Frederick county, and organized what Bishop Asbury believed to be the first Methodist congregation in America. From this place the spread of Methodism in the colonies was carried on by Strawbridge and others with gratifying results. Baltimore soon became an important centre, and from 1775 until 1784, when the Methodist Episcopal Church was formed, it was the meeting-place of the annual conferences of the Methodist churches in America. The convention which organized the Methodist Episcopal Church also met in Baltimore in 1784, eighty-three itinerant ministers being present from various parts of this country. Francis Asbury became one of the two bishops of the new Church, and made Baltimore his episcopal residence for many years. The society was at first opposed to general conferences, and until the bounds of the annual conferences were marked out in 1792, Baltimore conference was the first in point of members and importance. The first college of the denomination, Cokesbury College, was established in Harford county, in 1785, and it is worthy of note, also, that the first native itinerant preacher, and the first native local preacher, were both Marylanders. The first general conference of the Church assembled in Baltimore in 1792, and until 1812 the quadrennial sessions of that body were all held in the same place. In 1820 and 1824, in 1840, and again in 1876, the conference returned to Baltimore. In 1884, on the suggestion of the M. E. Church South, the centennial of American Methodism was celebrated in Baltimore by a congress which included representatives of every branch of the Church.

The Methodist Episcopal Church in Maryland at the present time is largely under the jurisdiction of three Annual Conferences, all of which

assembled in March of each year. The Baltimore conference is the largest of the three; it has 360 ministers and local preachers connected with it, and includes churches in the counties of the Western Shore, in Washington, Pennsylvania and West Virginia. The boundaries of the conferences of the Methodist Episcopal Church frequently overlap each other, and it is not, therefore, surprising to find that the Washington conference, with its 340 preachers, occupies nearly the same field as the Baltimore conference, with the addition of the upper counties of Virginia. The churches on the Eastern Shore of Maryland belong to the Wilmington conference and the Delaware conference. The Garrett county congregation are united with the West Virginia conference, and several German Methodist churches in Baltimore are affiliated with the East German conference.

The Methodist Protestant Church had its beginnings in Maryland, which is still the third largest State in the number of its communicants. The separation of the denomination from the Episcopal Methodist government was the outcome of a movement for church reform by the admission of the laity to a share in the administration. In 1824 a Union Society was formed in Baltimore having this object in view, and a periodical started in that city to advocate it. In 1827 a convention of the reformers was held in Baltimore, and drew up a petition, which was rejected by the general conference of 1828. The Baltimore society started anew an agitation which resulted in the expulsion of its leaders from the church. Many sympathizers followed them, and in 1828 a convention was held in Baltimore, which drew up a provisional form of organization. Two years later another gathering took place in the same city, and the Methodist Protestant Church was constituted. Baltimore continued to be the centre of the denominational work, and the general conferences frequently assembled here and elsewhere in the State. That of 1877 is noteworthy for the reunion which then took place between the parent body and a large body of members who had seceded on the question of slavery and formed "The Methodist Church." The Methodist Protestant Church in Maryland is strongest numerically in Baltimore city and the counties immediately adjacent, and on the Eastern Shore. Its governing body is the Maryland Conference, which is the largest of the church conferences, and includes also Delaware and portions of Virginia, West Virginia and Pennsylvania. The colored churches belong to the Baltimore Colored Mission.

The Methodist Episcopal Church South was very slightly represented in Maryland until the outbreak of the civil war. According to the "plan of separation" drawn up in 1844, the Baltimore Conference adhered to the Northern Church, and continued in this relation until 1860. The General Conference of that year so changed the book of discipline that

in 1861 the Baltimore Conference determined to submit no longer to the General Conference of the Northern Church. During the four years of the war it maintained an independent position; but in 1866 it determined by a unanimous vote to unite with the M. E. Church South. Several churches of that denomination having been organized in Maryland since the war, the local conference was rearranged and finally reconstructed in the form which it now has. The Baltimore Conference includes eighteen of the twenty-one counties in which the denomination is represented in Maryland, beside Washington and parts of Pennsylvania, Virginia and West Virginia. Dorchester, Wicomico and Worcester counties are included in the Virginia Conference. One of the bishops of the M. E. Church South has his episcopal residence in Baltimore, which is also the home of two bishops of the colored Methodist churches—one of the African M. E. Church, the other of the African M. E. Zion Church. The strength of these colored churches lies almost entirely in the city, the former being much wealthier and more influential. The two denominations have recently decided to unite under the name of the African and Zion M. E. Church.

### THE PRESBYTERIAN CHURCH.

The early history of the Presbyterian Church in America is very closely associated with colonial Maryland. According to the generally received account, the first Presbyterian Church in America was organized at Snow Hill, Md., about the close of the seventeenth century, by the Rev. Francis Makemie, an Irish clergyman, who had been invited to Maryland by a member of Lord Baltimore's Council. According to another account, the first congregation is to be found still earlier, at Annapolis, among the so-called Puritans who settled there from Virginia in 1649. But whether founded in 1649 or 1700, the fact still remains that the Presbyterian faith spread rapidly in Maryland during colonial days, and Maryland members of the denomination were prominent in organizing the first Presbytery, that of Philadelphia, in 1707. Since those times, however, the Church has not grown with the same rapidity in this State as elsewhere; and in the order of numerical strength, Maryland is now the fifteenth State on the Presbyterian roll. In the controversies which have cut up the parent body, the Presbyterians of Maryland took no leading part, although some fifteen hundred of them are members of the Southern branch of the Church.

The Maryland Presbyterians in the Northern body are included in three Presbyteries—those of Baltimore, which is entirely in Maryland; Washington City, which includes Montgomery and Prince George's counties, and Newcastle, which includes the counties on the Eastern Shore. These three are part of the Synod of Baltimore, which was

carved out of the Synod of Philadelphia in 1854. The Southern Presbyterians are all included in the Presbytery of Maryland, except one congregation in Garrett county, which belongs to the Winchester Presbytery.

### THE FRIENDS.

The early history of the Quakers in America is likewise closely associated with colonial Maryland, for it was on the Patuxent River that George Fox, the founder of the sect, landed in 1672 on his first visit to America. Here he found a small body of his followers suffering persecution from the colonists because of their refusal to bear arms, and with them he organized at West River, Anne Arundel county, in the same year, the second yearly meeting of Friends in America, the first having been formed in 1661 in Rhode Island. The Friends in Maryland at the present time are found chiefly in Baltimore city and Harford, Baltimore, Montgomery and Carroll counties. The Orthodox Friends belong to the Baltimore Yearly Meeting, which includes Washington and portions of Virginia and Pennsylvania. The Hicksite Friends have also formed a Baltimore Yearly Meeting, covering nearly the same territory, but including almost three times as many members.

### THE GERMAN CHURCHES.

The prominence in Maryland of the Lutheran, German Reformed and United Brethren Churches can easily be accounted for by the constant stream of German immigration which has been pouring into the State since the beginning of the eighteenth century. The members of these three denominations are nearly all German by birth or descent, and in more than half of their congregations German is used to the exclusion of English, or side by side with it. The strength of these German churches is found in Baltimore city and county, in Carroll, Frederick, Washington and Garrett counties, all of which contain the chief settlements of the German immigrants into the State.

Maryland is very intimately associated with the movement for Lutheran union which resulted in the formation of the General Synod in 1820. The first meeting at which the matter was discussed was held in Baltimore in 1819, the plan for union formally drawn up at Hagerstown in 1820, and the first regular meeting of the General Synod held at Frederick in 1821. Since that time this supreme body has several times met at various places in Maryland.

In the dissensions which have split up the Lutheran Church in America into a dozen branches, the members of the faith in Maryland have never taken a prominent part. A large majority of them still belong to the parent body—the General Synod—but the Synodical

Conference and the Ohio Synod each have a following of several thousand. The adherents to the General Synod are members of the Synod of Maryland, which also includes congregations in neighboring States. It is the oldest and next to the largest synod of that body.

The United Brethren Church had its origin and organization in Baltimore more than a century ago, under Rev. William Otterbein, a Lutheran clergyman, who came to Baltimore in 1770, and in 1774 organized what he called an Evangelical Reformed Church, which became the centre of a considerable conference of churches under the name of the United Brethren. He and Rev. Martin Boehm were the first superintendents, or bishops; and under the care of these men and their successors, the Church has grown to be one of the most important of the German-American sects. The geographical boundaries of the local synods are not well defined, and the members of the Church in Maryland are contained in no less than three synods.

Maryland is also one of the strongest centres of the Reformed (German) Church, ranking after Pennsylvania and Ohio in the order of numerical strength. Its members are included under (1) the Maryland Classis, which contains the English members of the Church, and belongs to the Synod of the Potomac; (2) the German Maryland Classis, belonging to the German Synod of the East.

### THE BAPTIST CHURCH.

The Baptists, too, are not closely united under any form of church administration, but nearly all the separate congregations in the State are connected with the Maryland Union Baptist Association, which was formed in 1836, with six churches, four ministers and three hundred and forty-five members. It originally included the churches of the District of Columbia, but the last of these withdrew in 1879 to join a District association. The union has no legislative authority, but merely advises the separate congregations on points of discipline and government. It holds meetings annually, but during the interim its place is taken by an Executive Board, which meets bi-monthly. For local and social purposes the Baptist congregations in the State are divided into three district associations—Eastern, Middle and Western. The main strength of the denomination lies in the city of Baltimore. Nearly one-half of the total membership is comprised in the colored churches, which have recently organized a separate State body under the name of the Maryland Baptist State Convention.

### THE JEWS.

It was not until the year 1825 that the people of Maryland removed all political disabilities from the Jews, and admitted them to public

office. There were at that time only one hundred and fifty Jews in the State, but after their enfranchisement the influx of co-religionists was rapid and continuous. It is now estimated that there are over ten thousand Hebrews in the State, though this showing does not appear in the official statistics because of the fact that only heads of families are customarily enrolled as members. Their congregations are entirely autonomous, and there is no form of association or union existing between them. The Orthodox Jews have three congregations in Baltimore; the Reformed Jews, eight in Baltimore and one in Allegany county.

### CHURCH ARCHITECTURE.

One of the most noticeable tendencies in Maryland churches during the past twenty-five years has been the erection of large and costly structures, embodying the latest and most original ideas of church architecture. This has been more particularly the case in Baltimore, where by means of the increasing wealth of congregations, and the generosity of influential members, the plainer structures of the past have given way to beautiful buildings whose total cost has been estimated at several millions of dollars. This tendency has not been confined to one or two denominations, but has included nearly all. Of eight churches which may be taken as the most typical examples, two are Presbyterian, two Methodist, two Hebrew, one Catholic and one an independent body. All but two of them are the work of local architects. The earliest was the First Presbyterian Church, a brownstone structure, erected in 1859, and modeled by the architects after the Gothic Cathedral at Freiburg. Mt. Vernon M. E. Church was completed in 1872, after designs by the late Charles L. Carson, of Baltimore, and is said to be one of the handsomest Methodist churches in this country. It is decorated English Gothic in its design, the materials used in its construction being mainly serpentine, from quarries in Baltimore county. Mr. Carson was also the architect of the magnificent Byzantine structure occupied by the Baltimore Hebrew congregation. His successor, Mr. Joseph E. Sperry, was the architect of the stately marble Synagogue of the Oheb Shalom congregation, now nearly completed. This edifice, with its massive dome, occupies a commanding position on one of the highest hills in the city. It is in the Free Renaissance style, the marble used in its construction being from Baltimore county. In 1887 the new building of the First M. E. Church was completed after designs by McKim, Mead and White, of New York. It is a granite structure, of Lombardic design, and was modeled very closely after the famous cathedral at Ravenna. A very original design in the Romanesque style is the new home of the Associate Reformed Church, erected in 1889, by Charles E. Cassell, of Baltimore. Mr. Cassell also designed the English Gothic edifice occupied

by the Boundary Avenue Presbyterian Church, and was associated in the construction of the stately Decorated Gothic structure of the Corpus Christi Catholic Church.

## SUNDAY SCHOOLS.

The work of the Sunday schools in Maryland has, in the past thirty years, been largely under the supervision of the Maryland Sunday School Union, which was formed in 1856. Of recent years the work has grown very rapidly, until the membership of the Protestant Sunday schools is larger than that of the churches themselves. The following statistics of the Sunday school organizations in Baltimore and the various counties have been obtained through the courtesy of Mr. William A. Baker, State Superintendent of the Union:

| Counties. | Sunday Schools. | Officers and Teachers. | Scholars Enrolled. | Total Membership. | Average Attendance. | Population between 5 and 21 years of age. Based on 11th Census. |
|---|---|---|---|---|---|---|
| Allegany | 84 | 1,248 | 9,635 | 10,883 | 6,329 | 16,004 |
| Anne Arundel | 99 | 978 | 7,268 | 8,246 | 4,601 | 13,126 |
| Baltimore | 212 | 2,416 | 18,294 | 20,710 | 13,426 | 28,070 |
| Baltimore City | 360 | 9,031 | 93,313 | 102,344 | 67,473 | 167,282 |
| Calvert | 45 | 401 | 2,497 | 2,898 | 1,757 | 3,796 |
| Caroline | 69 | 726 | 3,575 | 4,301 | 3,237 | 5,353 |
| Carroll | 120 | 1,507 | 9,250 | 10,757 | 8,148 | 12.465 |
| Cecil | 78 | 867 | 6,893 | 7,760 | 5,222 | 9,953 |
| Charles | 33 | 201 | 1,365 | 1,566 | 1,107 | 5,848 |
| Dorchester | 74 | 922 | 5,824 | 6,746 | 4,499 | 9,565 |
| Frederick | 156 | 2,326 | 15,252 | 17,578 | 11,232 | 19,062 |
| Garrett | 115 | 932 | 3,280 | 4,212 | 2,922 | 5,472 |
| Howard | 36 | 422 | 3,103 | 3,525 | 2,254 | 6,263 |
| Harford | 98 | 1,023 | 6,520 | 7,543 | 5,042 | 11,162 |
| Kent | 56 | 665 | 4,953 | 5,618 | 3,505 | 6,726 |
| Montgomery | 80 | 760 | 5,090 | 5,850 | 3,913 | 10,466 |
| Prince George's | 74 | 613 | 4,525 | 5,138 | 3,308 | 10,041 |
| Queen Anne's | 74 | 744 | 5,105 | 5,849 | 3,872 | 7,107 |
| St. Mary's | 19 | 136 | 891 | 1,027 | 633 | 6,090 |
| Somerset | 71 | 915 | 6,899 | 7,814 | 4,913 | 9,300 |
| Talbot | 63 | 744 | 5,414 | 6,158 | 3,855 | 7,598 |
| Washington | 161 | 2,206 | 11,230 | 13,436 | 8,882 | 15,316 |
| Wicomico | 52 | 584 | 4,368 | 4,952 | 3,003 | 7,673 |
| Worcester | 77 | 827 | 5,456 | 6,283 | 4,027 | 7,603 |
| Catholic in City | 65 | 315 | 13,825 | 14,140 | 10,359 | ............ |
| Catholic in County | 54 | 153 | 5,364 | 5,517 | 4,114 | ............ |
| Hebrew in City | 9 | 55 | 739 | 794 | 620 | ............ |
| Totals | 2,434 | 31,717 | 259,928 | 291,645 | 193,253 | 401,341 |

## RELIGIOUS COMMUNITIES.

The most prominent of the many Catholic orders within the State are the Redemptorists, Jesuits, Passionists, Sulpicians, Brothers of the Christian Schools and Xaverian Brothers. The Redemptorists are mainly engaged in pastoral work among the foreign Catholic population, and

have five residences at churches in Baltimore city. That connected with St. Alphonsus Church is likewise the residence of a provincial of the order. The Redemptorists have a house for novices at Annapolis, containing nine priests, three choir novices and sixteen lay brothers; and a house for theological study at Ilchester, Howard county, containing twenty-two priests, seventy-three professed students and twenty lay brothers. The total number of members of the order in the State is not far from two hundred. The Jesuits are engaged in teaching in Baltimore and Frederick, and in mission work in Southern Maryland. They have a seminary at Woodstock, a novitiate at Frederick and Loyola College, a secular institution in Baltimore. The Passionists have a monastery near Catonsville, Baltimore county, and supply many missions in the immediate neighborhood. The Sulpicians control St. Sulpice Seminary, St. Mary's University, St. Joseph's Seminary and Epiphany Apostolic College, in Baltimore, and St. Charles College, Howard county. The Brothers of the Christian Schools have a novitiate at Ammendale, Prince George's county, which is likewise the residence of a provincial of the order. Its members conduct Rock Hill College, Ellicott city; Calvert Hall, Baltimore; St. Vincent's Male Orphan Asylum, Baltimore, and many parochial schools in Baltimore. The work of the Xaverian Brothers is very similar. They have a novitiate in Baltimore county, which is also the residence of the provincial; a community in St. Patrick's Parish, Baltimore; and they conduct Mount St. Joseph's College, near Catonsville; St. Mary's Industrial School for Boys, near Catonsville; St. James' Home for Boys, in Baltimore; and are engaged as teachers in many parochial schools. The Capuchins have a monastery at Cumberland, and there are also Brothers of Mary and members of the Benedictine and other orders engaged in pastoral work in the diocese.

The Catholic sisterhoods within the State are very numerous, but it is impossible to obtain any definite statistics regarding their numbers. The greater part of them are engaged in teaching or in the care of the sick. The best known orders are those of the Sisters of Notre Dame and the Sisters of Charity. The former are occupied almost entirely with the instruction of the young, the latter with the conduct of hospitals and asylums. The mother-houses of both lie within the bounds of the State, the former at Govanstown, the latter at Emmitsburg. In the former there are the following inmates: Professed religious, 38; novices, 21; postulants, 16; sisters, 60; boarders, 130; day pupils, 30. The Sisterhood has smaller convents in eight of the parishes of Baltimore, and occupies itself with conducting the schools of the parish. Sisters of Notre Dame are also engaged in five other parochial schools of Baltimore, and superintend an orphan asylum there. They have a convent and academy at Annapolis, another at Hagerstown, and a mission house

at Towson. The Sisters of Charity have 200 professed sisters, 50 novices, and 100 pupils at their mother-house at Emmitsburg. They have charge of an orphan asylum and a house of industry in Baltimore; an orphan asylum near Melvale, Baltimore county; a hospital and retreat for the insane at Mount Hope, and a hospital near Catonsville. They also conduct an academy and school at Emmitsburg; an academy at Leonardstown, and five parochial schools in Baltimore. The Sisters of Mercy have a convent at Mount Washington and another in Baltimore. They have charge of the City Hospital, a home for working girls, and four parochial schools in Baltimore, and an academy at Cumberland. There are Convents of the Visitation, with female academies attached, at Baltimore, at Frederick, and at Mount de Sales, near Catonsville. The Franciscans have houses on Maryland avenue and St. Paul street, in Baltimore, and at Highland Park, from which they carry on mission work and schools among the colored people. The Oblate Sisters of Providence is the name of an order of colored sisters working in Baltimore among their own race. There are also convents, schools and asylums in Maryland managed by the following sisterhoods: Benedictines, Carmelites, Ursulines, Little Sisters of the Poor, Sisters of St. Joseph, of the Good Shepherd and of the Holy Cross. The Sisters of Bon Secours founded a convent in Baltimore in 1881, from which they go out to nurse in the homes of the sick without regard to denomination or color.

The Protestant communities within the State are few in number. The largest Episcopalian Order is the Sisterhood of All Saints, Mt. Calvary parish of Baltimore. The sisterhood was originally started as a branch of an English Order, but is now entirely independent of foreign control. Bishop Paret, of the Diocese of Maryland, is the official visitor of the Order, which includes eighteen or twenty Sisters living in two houses, and carrying on parish work among both white and colored. The white Sisters conduct a training home for girls and a sewing school; the colored Sisters a home for colored boys, a day school and a fresh-air fund. The parish work of St. John's Parish, Waverley, including an Orphanage and a Parochial School, is also managed by an Episcopal Sisterhood under the direction of the rector. The Episcopalians have a Brotherhood called the Order of the Holy Cross, whose headquarters are at Westminster. During the summer they give instruction in theology and parochial administration to a number of young clergy. They also hold themselves ready to obey a request for mission work in any diocese in this country. The Methodist Episcopal Church opened in 1892 a Deaconesses' Home in Baltimore. It is supported by the Woman's Home Missionary Society, and its inmates are engaged in nursing, visiting and teaching. A movement has recently been started among the members

of the Baltimore Conference to enlarge and greatly extend the scope of the work in Maryland.

### RELIGIOUS ASSOCIATIONS.

Probably the most remarkable development in the recent history of American churches has been what may be called, for want of a better term, the specialization of religion. By this is implied an adaptation of the methods and means of the churches to meet the socio-religious demands of particular classes, by the formation of special associations, religious in purpose, national or international in extent, and denominational or undenominational in character. This tendency has been most strongly marked among the young people of both sexes, and young men's and young women's associations or guilds are now found in nearly every city or congregation in this country. Maryland was one of the first States to enroll herself in the work, and her enlargement of the idea has kept pace with the development in other States. The first Young Men's Christian Association in Maryland was organized in Baltimore in 1853, and a State organization was effected in 1872. There are now nineteen such associations in the State, six of them being in various colleges, six in Baltimore city, and the rest in separate towns in Western Maryland. The city associations all own or occupy commodious buildings suited to their needs—two of them, the main building on Saratoga and Charles streets, and Levering Hall, the home of the Johns Hopkins Y. M. C. A.—being specially constructed for the needs of these branches. The following statistics of the Y. M. C. A. are taken from the annual report for 1893:

| | Number. | Active Members. | Associate Members. | Total. | Vols. in Libraries. | Value of Buildings, Etc. |
|---|---|---|---|---|---|---|
| Baltimore Associations | 6 | 1,270 | 1,533 | 2,803 | 2,999 | $285,505 |
| College Associations | 6 | 264 | 158 | 422 | 700 | 20,000 |
| Other Associations | 7 | 230 | 300 | 530 | 3,825 | 125 |
| Totals | 19 | 1,764 | 1,991 | 3,755 | 7,524 | $305,630 |

In 1890 there was organized in Baltimore a Young Men's Hebrew Association, similar in its purposes and aims to the Young Men's Christian Association. It includes about four hundred members. There is also a colored Young Men's Christian Association, having a rapidly increasing membership among the many colored churches of Baltimore.

The Young Women's Christian Association of Baltimore was organized in 1882, and has increased very rapidly in numbers and influence. The association now owns and occupies a large building in Baltimore, valued at $50,000. The resources of the association are supplied mainly

by outside subscriptions, and not by the young girls themselves. A particular feature of the work is the use of the central building for a boarding-house and lunch-room for hundreds of working girls. There are three branches of the main association in Baltimore—Mothers' Branch, comprising fifty members, and occupied with the care of needy women in confinement; Eastern Branch, or Helping Hand Society, with two hundred young girls under its care; and a Northwestern Branch, with twenty-seven members. There is also a Young Women's Christian Association connected with the Western Maryland College at Westminster, a co-educational institution.

The National Woman's Christian Temperance Union has a very large and active membership in the State. The centre of its activity is a Memorial Building in Baltimore, purchased in 1891 at a cost of over $30,000. In addition to the promotion of total abstinence, the organization also carries on much charitable and religious work. Branches are found in all but three of the counties. The following statistics are from the last annual report of the corresponding secretary: Number of branch unions, 168; juvenile unions, 86; active members, 3,157; honorary members, 887; juvenile members, 4,596; total membership, 8,640.

In addition to these various non-sectarian bodies, there are likewise organized within the State hundreds of branches of national associations whose work is much more closely associated with the separate churches and congregations in which these branches are formed. They have no separate homes, or central buildings, but meet in the church buildings and confine their efforts to religious and charitable work within the congregation. The care and conduct of the weekly prayer-meeting usually devolve upon them, as well as the direction of many sewing-schools and branch missions. The separate branches are bound together by State and district officers, and by annual and quarterly conventions. The largest of these bodies within the State is the Young People's Society of Christian Endeavor, branches of which exist in nearly every county. It is non-sectarian, and includes in its ranks representatives of sixteen denominations, the most prominent of whom are the Methodist Protestants, Lutherans, Presbyterians and Baptists. In January, 1893, there were 192 societies within the State, of whom 68 were in Baltimore. The total membership was 8,884. The next largest body is the Epworth League, which in 1892 was taken under the patronage of the Methodist Episcopal Church. There is no State organization, the separate unions being grouped together on the same territorial lines as the Annual Conferences into which Maryland is divided for administrative purposes. Branches are found in nearly every congregation, and the total State membership is estimated at 6,000 members. The Order of the King's Daughters and Sons is non-sectarian, and reported in January, 1893,

of the Baltimore Conference to enlarge and greatly extend the scope of the work in Maryland.

### RELIGIOUS ASSOCIATIONS.

Probably the most remarkable development in the recent history of American churches has been what may be called, for want of a better term, the specialization of religion. By this is implied an adaptation of the methods and means of the churches to meet the socio-religious demands of particular classes, by the formation of special associations, religious in purpose, national or international in extent, and denominational or undenominational in character. This tendency has been most strongly marked among the young people of both sexes, and young men's and young women's associations or guilds are now found in nearly every city or congregation in this country. Maryland was one of the first States to enroll herself in the work, and her enlargement of the idea has kept pace with the development in other States. The first Young Men's Christian Association in Maryland was organized in Baltimore in 1853, and a State organization was effected in 1872. There are now nineteen such associations in the State, six of them being in various colleges, six in Baltimore city, and the rest in separate towns in Western Maryland. The city associations all own or occupy commodious buildings suited to their needs—two of them, the main building on Saratoga and Charles streets, and Levering Hall, the home of the Johns Hopkins Y. M. C. A.—being specially constructed for the needs of these branches. The following statistics of the Y. M. C. A. are taken from the annual report for 1893:

| | Number | Active Members | Associate Members. | Total. | Vols. in Libraries. | Value of Buildings, Etc. |
|---|---|---|---|---|---|---|
| Baltimore Associations | 6 | 1,270 | 1,583 | 2,908 | 2,999 | $255,35[illegible] |
| College Associations | 6 | 364 | 158 | 422 | 700 | 30,00[illegible] |
| Other Associations | 7 | 380 | 300 | 530 | 3,335 | 15 |
| Totals | 19 | 1,764 | 1,991 | 3,755 | 7,334 | [illegible] |

In 1890 there was organized in Baltimore a Young Men's Hebrew Association, similar in its purposes and aims to the Young Men's Christian Association. It includes about four hundred members. There is also a colored Young Men's Christian Association, having a rapidly increasing membership among the many colored churches of Baltimore.

The Young Women's Christian Association of Baltimore was organized in 188[illegible], and has increased very rapidly in numbers and influence. The association now owns and occupies a large building in Baltimore valued at $[illegible]. The resources of the association are supplied mainly

about 5,000 members, belonging to 142 circles, of which 105 were in Baltimore. The Girls' Friendly Society is under the protection of women of the Episcopal Church, and has for its active members girls of any creed, bound together for mutual help—secular and religious. There are about twenty-five branches in Maryland, with 300 associates and over 1,500 active members.

Besides these organizations there are many others of smaller numbers, including branches in various churches of the State. Among them are the Society of St. Vincent of St. Paul (Catholic); the Daughters in Israel (Hebrew); the Daughters of the King (Episcopalian); Young Catholics' Friend Society (Catholic), and the Brotherhood of St. Andrew's (Episcopalian).

### RELIGIOUS PUBLICATIONS.

The number of religious papers issued within the State is sixteen, of which six are weekly, nine monthly, and one quarterly. Of the weeklies two are Catholic, two Methodist Episcopal, one Baptist and one Methodist Protestant. The monthlies and the quarterly include two Catholic, one Methodist Episcopal, one Baptist (colored), one Episcopalian, one Independent Methodist, two Evangelical and three Y. M. C. A. bulletins. All of these journals are issued at Baltimore except the organ of the Frederick City Y. M. C. A.

The only denominational publishing houses in Maryland possessing an official character belong to two branches of the Methodist faith. The larger one is the Methodist Book Depository, which is located in Baltimore, under the direction of the Baltimore Conference of the M. E. Church. The other is the Central Book Concern of the Methodist Protestant Church, established in Baltimore in 1831, shortly after the formation of the Church. There are likewise publishing houses of the Baptist and M. E. South Churches, controlled by individuals, but possessing the endorsement of their respective Churches.

The Maryland Bible Society was formed in May, 1833, under the presidency of Hon. William Wirt. During the fifty-nine years of its existence it has distributed 1,038,596 volumes of the Scriptures, has received from sales, gifts and bequests over $600,000, and has transmitted to the American Bible Society nearly $75,000, to be used in increasing the circulation of the Bible throughout the world. It employs three colporteurs in the city and ten in the counties, and also makes use of auxiliaries among the ladies of Baltimore, and in Somerset, Frederick, Wicomico and Allegany counties. The Maryland Tract Society was first organized in 1844, and now makes use of three colporteurs and over one hundred and fifty tract distributors.

### RELIGIOUS CAMP-MEETINGS.

Camp-meetings were very early introduced into Maryland by members of the Methodist Church, and they have since been fostered mainly by the various branches of that denomination. The sites on which they are held are now usually owned by a stock company, comprising members of the churches who direct the meetings. Tenters frequently occupy the grounds during the months of July and August, but the religious meetings for prayer, exhortation and conversion do not occupy more than two weeks of that time. The largest and most important camps are: Emory Grove, Baltimore county, under the direction of the M. E. Church; Wesley Grove, Howard county, M. E. Church South; Summit Grove, near the Pennsylvania state line, M. E. Church; Deal's Island, Chesapeake bay, M. E. Church; Mt. Airy, Frederick county, M. P. Church; Glyndon Camp, Baltimore county, Prohibitionist; Washington Grove, Montgomery county, M. E. Church, and Asbury Grove, Baltimore county, M. E. Church (colored).

### CEMETERIES AND BURYING-GROUNDS.

In the several counties of the State the bodies of the dead are buried either in the churchyard surrounding the local church or in the scores of private family cemeteries to be found in every rural district. It is only near the larger towns and cities, and more particularly near Baltimore, that undenominational public cemeteries exist, under the care and direction of stock associations incorporated under an act of the State Legislature. Greenmount Cemetery, in the northern section of Baltimore, is the most important and most interesting of these cities of the dead. It contains the remains of many prominent Marylanders who have died within the past fifty years, among them being those of John McDonogh, Johns Hopkins, Junius Brutus Booth and several of his family. Other large cemeteries of Baltimore are Loudon Park, containing many beautiful monuments, and interesting because of the beauty of its landscape gardening; Mount Olivet, containing the remains of Asbury and other Methodist Episcopal Bishops, over whom a graceful shaft has been placed; and Bonnie Brae, in which are the bones of Charles Carroll of Carrollton, originally interred at his manor in Howard county. An interesting survival of a rural churchyard in the midst of a large city is to be found in the Westminster Presbyterian Church of Baltimore, in the yard of which are many old vaults and tombs, among them being that of Edgar Allen Poe. Another interesting survival is the old family burying-ground in Druid Hill Park, containing the remains of several generations of the Rogers family, the former owners of the ground now contained in the park.

Several military and national cemeteries are to be found within the State, the largest of them being on Antietam battle-field. Five thousand Union soldiers are buried here, fifteen hundred of them being those who fell in the engagement of September 17, 1862. The rest were brought from Monocacy, South Mountain and Harper's Ferry. The Confederate soldiers who fell at Antietam are buried near Hagerstown. Twenty-three hundred Union soldiers from the hospitals in and around Baltimore are buried in the national cemetery at Loudon Park, which also contains a Confederate burying-ground with three hundred dead in it. At Annapolis there is a government burying-ground containing the bodies of two thousand five hundred returned prisoners, who died at Camp Parole, near that city. Two thousand Confederates are buried at Point Lookout, where most of them died while prisoners of war.

# CHAPTER XIV.

## EDUCATION.

### PUBLIC SCHOOLS.

The father of the public school system of Maryland was Francis Nicholson, Royal Governor of the Province, 1694-1698. Down to his time there had been no general provision for education, but under his influence the Assembly in 1694 passed an act for the maintenance of free schools by duties laid on exported furs, which then formed a large item of Maryland's trade. In 1696 King William School was founded at Anne Arundel Town (afterwards Annapolis), and provision was made for the erection of others. King William School afterwards became St. John's College, which still flourishes. In 1723, an act was passed looking to the establishment of one free school in every county. These schools were the only ones supported by the colony and State until well into this century.

Various measures dealing with public education were enacted during the first half of this century, but no general and effective system was established until 1864, when a State Board of Education was created, and a Superintendent of Public Instruction appointed. Under the present law the schools in each county are under the control and supervision of county school boards appointed by the Governor. The board of Baltimore city consists of one commissioner from each ward. The principal of the State Normal School is the chief executive officer of the whole system. The schools are supported by a State tax, supplemented by local taxation in each county. Appropriations are also made by the Legislature for the assistance of some colleges and academies which do not belong to the system, and the institutions so aided usually bestow free scholarships.

In the year ending July 31, 1891, the period covered by the last report of the State Board of Education, there were in Maryland (exclusive of Baltimore city), 2,089 public schools, with 123,456 enrolled pupils and 2,723 teachers. For colored children there were 450 schools.

The State Normal School for the training of teachers was established in 1866, and occupies a handsome building in Baltimore, on the corner of Lafayette and Carrollton avenues. To this each county is entitled to send two students for each representative in the Assembly, and a limited number of others are received on the payment of tuition.

The State School for the Deaf and Dumb was founded in 1868 and located in Frederick City. Pupils are received between the ages of nine and twenty-one. Children of Marylanders receive gratuitous board and instruction, but those from other States pay $150 yearly. Both the sign language and articulation are taught, and in addition to the ordinary branches of education the pupils are trained in various handicrafts.

The State School for the Blind is situated on North avenue, near Calvert street, Baltimore. This is not an asylum, but a school of instruction, and is supported in part by an appropriation which entitles the State to free scholarships, and in part by the income from endowments. The blind of the District of Columbia are also educated here. In addition to scholastic instruction a number of gainful occupations are taught, such as music, piano-tuning, broom-making and chair-caning. There is also in Baltimore a school for the colored blind and deaf, to which the State appropriates $7,000. Pupils are also sent here by the State of West Virginia and the District of Columbia.

### BALTIMORE PUBLIC SCHOOLS.

The public school system of Baltimore was established in 1827 by an ordinance creating a Board of Commissions and investing them with the necessary powers. The earliest schools were elementary and conducted on the Lancasterian system, but in process of time the course was enlarged and grammar schools added to the primary. In 1839 a high school for boys was established, followed by two for girls in 1844. The boys' high school was afterwards erected by legislation into the Baltimore City College. After the civil war, free schools were opened for colored children and were graded like the others.

On January 1, 1893, there were one hundred and fifty-six day schools and eight night schools in Baltimore, classed as follows: The City College, two high schools for girls, the Manual Training School, forty grammar schools, sixty-three primary schools, five English-German schools, eighteen schools in the annexed wards (Twenty-first and Twenty-second), and eighteen schools for colored children. In these were employed 1,430 teachers. The day schools were attended by 54,406 pupils, and the night schools by 1,413. These schools occupy 108 buildings. The expenditure for 1892 was $1,009,444, of which $800,978 was for salaries.

### BALTIMORE CITY COLLEGE.

This, as has been said, was formerly the boys' high school, which in 1866 was made a college by legislative enactment, though it has never conferred degrees. When first opened, it received only the advanced pupils of the grammar schools, but afterwards was opened to all qualified to enter. At present it has a faculty of fifteen members and four hundred and fifty scholars. The standard of scholarship is high, and students who have completed its courses are received in the Johns Hopkins University without further examination. A building on Howard street was constructed for it in 1873 and used until 1892, when a sinking of the bed of the street, caused by tunnelling, occasioned its downfall. The college now occupies temporary quarters on Fayette street.

The high school for colored children is on Saratoga street, east of Charles.

### BALTIMORE POLYTECHNIC INSTITUTE, FORMERLY THE MANUAL TRAINING SCHOOL.

This is the first school of its kind established in the United States as a part of the public school system. It is not designed to teach any special handicrafts, to turn out carpenters or blacksmiths, but to teach the use of tools and the elementary mechanical processes and arts in dealing with wood, the metals, etc., thus giving the eye, hand and brain a training which is not given in the literary courses of the schools. Its building is situated on Courtland street, and has room for five hundred students. The building contains boiler-rooms, machine shops, forges, work-rooms for steam engineering, pattern making, carpentery, wood carving, free-hand and mechanical drawing, laboratories for physics and chemistry, recitation-rooms, gymnasium and swimming-pool.

### MANUAL LABOR SCHOOL.

The Baltimore Manual Labor School for indigent boys, founded in 1845, is situated at Arbutus, in Baltimore county, on a farm of one hundred and forty acres. The scholars, who are mostly sons of indigent widows, are trained in farm work, and also receive a school education.

## COLLEGES AND UNIVERSITIES.

### THE UNIVERSITY OF MARYLAND.

Most of the older universities in this country were developed from colleges, but this institution had its origin in a medical school. In 1802 Dr. John B. Davidge, of Baltimore, opened a private medical class, which was so successful that in 1807, in connection with two other physicians, he obtained from the Assembly a charter for the College of Medicine of Maryland, and permission to raise $40,000 by lottery. This college proved so great a success that the founder conceived the idea of making it part of a more comprehensive scheme, and in 1812 obtained an enlarged charter authorizing the college to constitute and annex three other faculties, of Divinity, Law and Arts, which combined should constitute the University of Maryland.

The faculty of divinity was never organized, that of arts was twice organized and twice perished, and that of law early gave up activity, to be revived, however, in 1869. The faculty of medicine has always been the largest school, having had a course of great prosperity and a succession of professors of distinguished ability and wide repute. In point of age it is the fifth medical school in the United States.

In 1812, the University purchased from Colonel John Eager Howard, at a price little more than nominal, the lot on the corner of Lombard and Greene streets, which has ever since been its home. The first building, which is still in use, was erected from the designs of R. C. Long, modelled on the Pantheon at Rome, and was at the time the finest medical college building in the United States. In 1823, the Baltimore Infirmary, under the control of the University, was built on the opposite side of Lombard street, where it still stands, though much enlarged. It now contains 250 beds, and receives annually $3,750 from the State and $6,760 from the city. In connection with the University are a nurses' training school and also the Free Lying-in Hospital on Lombard street, with from thirty-five to forty beds, which is also aided by the State.

The faculty of the medical school consists of ten professors, five lecturers, six demonstrators and three prosectors. A three years' course has been adopted.

Among the historic distinctions of this school are the introduction of hygiene and medical jurisprudence into the curriculum as early as 1833, the first lectures in the United States on dentistry in 1837, the enforcement of dissection, first or second of American colleges, the introduction of courses of comparative physiology and microscopy, and in 1867, the first independent chair of diseases of women and children.

The Law School occupies a building adjoining the Medical School. It has seven professors and over one hundred students. The course covers three years. Judge H. D. Harlan is the Dean of the Faculty.

In 1882, the Dental Department was organized with Dr. F. J. S. Gorgas as the Dean, and it has now about two hundred students. For graduation, attendance upon three sessions with clinical instruction, is required.

### JOHNS HOPKINS UNIVERSITY.

Baltimore owes a large debt of gratitude to her munificent citizens. The names of George Peabody, Moses Sheppard, Enoch Pratt, James McDonogh, Thomas Wilson, Mary Elizabeth Garrett, John W. McCoy and others appear elsewhere in these pages, and we have now to add to them that of the man whose great wealth enabled him to make the most splendid gift the city ever received—the name of Johns Hopkins.

This gentleman, a native of Maryland, had amassed an ample fortune in his long career as a successful merchant and banker, and being a bachelor without claims of family upon him, he conceived the idea of benefiting his native State and country, and perpetuating his name in two great foundations, a university and a hospital. He selected among his friends a body of trustees whose intelligence, integrity and liberal views eminently fitted them for the responsibility, and in 1867 the University was incorporated. In 1870, the Trustees met, organized and adjourned, not to re-assemble until after the death of the founder. Mr. Hopkins died in December, 1873, and by his will divided his estate, amounting to about seven millions of dollars, between the two institutions. The Trustees were informed, in a letter of instructions, of the general scope of the founder's plans, but were left unfettered as to the mode of carrying them into effect.

In December, 1874, Daniel C. Gilman, L.L.D., a graduate of Yale, and then President of the University of California, was offered and accepted the presidency of the new institution, an office he still holds. In the following year he spent some months in Europe, studying university organization, and maturing a system for the new foundation. In 1876, on February 22, a day since observed by the University in annual commemoration, the President was publicly inaugurated, and in his address intimated the scope, methods and aims of the Johns Hopkins University. "The object of the University," he said, "is to develop character, to make men. It misses its aim if it produces learned pedants, or simple artisans, or cunning sophists, or pretentious practitioners. Its purpose is not so much to impart knowledge to the students, as to whet the appetite, exhibit methods, develop power, strengthen judgment, and invigorate the intellectual and moral forces. It should prepare for the service of society a class of students who will be wise, thoughtful, progressive guides in whatever department of work or thought they may be engaged."

The founder had forbidden any part of the capital of the University to be used in the erection of buildings, therefore the beginnings were necessarily on a modest scale. A plain house on Howard street was enlarged and fitted up, and in it the Department of Philosophy began in the fall of 1876.

At the time the University was opened, there being comparatively little attention paid in this country to post-graduate work, it was decided to make this at first the leading feature of the institution, and a three year's graduate course was established, leading to the degree of Doctor of Philosophy. The undergraduate work was then organized, leading to the degree of Bachelor of Arts. This, as now arranged, presents for the student's choice, seven elective groups, equivalent in value.

A feature of the University is the publication of journals and other serials on scientific subjects, published by the University itself or under its auspices. The following are regularly issued, beside occasional publications, reports, &c.:

The American Journal of Mathematics.
The American Chemical Journal.
The American Journal of Philology.
Studies from the Biological Laboratory.
Studies in Historical and Political Science.
Contributions to Assyriology.
University Circulars.

Another periodical, Modern Language Notes, is edited by members of the faculty.

In the rear of the Front Building on Howard street, which contains the offices of administration, and class rooms in Ancient Languages, is the Library Building. This contains on the first floor Hopkins Hall, now used for chemical lectures; on the second floor the reading-room and general library, and on the third the rooms and library of the Department of History and Political Science. The next building to the west of this contains the chemical laboratories, lecture-rooms, &c., and still further west, on the corner of Eutaw street, is the Biological Laboratory. The building last constructed for purposes of instruction, and also the largest, is the Physical Laboratory, at the corner of Monument and Garden streets. It is a fine structure of pressed brick, trimmed with sandstone and surmounted by an astronomical observatory. Other departments of the University, such as Mineralogy, Geology, Modern Languages, &c., are temporarily housed in the near vicinity, until proper quarters can be provided for them.

In addition to the buildings already mentioned, there is the Gymnasium at the corner of Garden and Little Ross streets, and Levering Hall, a handsome edifice built at the cost of $20,000 and presented to

the University by Mr. Eugene Levering, a Baltimore merchant, for the use of the University Young Men's Christian Association. This hall stood formerly at the corner of Garden street, but in the summer of 1892 it was moved half a block westward to Eutaw street, to make room for McCoy Hall.

Mr. John W. McCoy, a retired merchant, and a liberal patron of arts and letters, left by will his valuable library of about 8,000 volumes (largely consisting of rare and costly works relating to art), to the University, and made it also his residuary legatee. From the funds thus derived the University is now constructing an imposing building to be called McCoy Hall. It extends from Monument to Little Ross street, and is intended to contain the offices of administration, the library and reading-room, the departments of Languages, History and Political Economy and a large lecture-hall.

The faculty (1893) consists of the president, twenty-nine professors, and one non-resident emeritus professor, six lecturers, seven associate professors, nine associates and nine instructors.

The general control of the University is vested in a board of thirteen trustees, of whom Mr. C. Morton Stewart is president.

The University annually awards twenty-one fellowships, yielding each $500, one of which is a private endowment; twenty scholarships for graduate students, yielding $200 each, and a varying number of undergraduate scholarships. These last are given to students from Maryland. There are also graduate scholarships for students from Virginia and North Carolina.

Two lectureships have been founded by the gifts of friends: the Percy Turnbull Lectureship of Poetry, founded by Mr. and Mrs. Lawrence Turnbull, in memory of their son, and the Levering Lectureship on Religious Subjects, founded by Mr. Eugene Levering. Mrs. Caroline Donovan, of Baltimore, has endowed a chair of English Literature.

The increase of students has been steady, rising from eighty-nine in the winter of 1876, to five hundred and forty-two in the winter of 1892; of whom more than three-fifths are post-graduate. In the sixteen years of the University's existence, two thousand and eleven students have been enrolled, of whom eight hundred were from Maryland; two hundred and eighty have received the degree of Ph. D., and three hundred and eighty that of A. B.

Soon after the opening of the Johns Hopkins Hospital, in 1889, a movement was set on foot by ladies of Baltimore to establish a medical school, to which women as well as men might be admitted, and in pursuance of this object they raised a fund of over $100,000, which the Trustees accepted, with the understanding that the school should be founded, when the fund should be raised to $500,000. Notwithstanding

the help which the University itself was able to give, more than three-fifths of the required sum were still lacking, when Miss Mary Elizabeth Garrett, of Baltimore, a lady distinguished for zeal and liberality in promoting the higher culture of women, generously made up the deficiency in December, 1892. This fund is to be kept intact and known as the Garrett fund. It is expected that this school will be opened in the fall of 1893, when a second Faculty, that of Medicine, will begin instruction.

The endowment of the university comprised Mr. Hopkins' country seat, Clifton, a beautiful tract of 330 acres, to the northeast of the city, 15,000 shares of the common stock of the Baltimore and Ohio Railroad, and other values amounting to about $750,000 more. The railroad stock had a par value of $100 per share, but being exempt from taxation and paying 10 per cent. dividends, its market value at the time was nearly $200, and Mr. Hopkins had expressly recommended that it should not be sold. But the road become involved in difficulties in 1887 and for several years following dividends were entirely suspended. Consequently the University found itself deprived of a great part of its revenue and that even its existence was imperilled. Generous friends, however, came to its assistance, and an emergency fund of $108,700 was subscribed, which tided it over the time of trial. The trustees effected a conversion of the stock in 1890, and the University was again placed on a sound financial basis.

The University is already known to the whole world by its contributions to knowledge. Prof. Rowland's investigations of the solar spectrum, and his diffraction-gratings, Prof. Brooke's exhaustive monograph on the oyster, Prof. Remsen's researches into the causes of contamination of water-supplies, Prof. Williams' geological maps have marked important steps in the advance of science. Of works produced by members of the University in the principal departments of knowledge, not even the names can be given here. Its influence has also been widely extended by the number of its alumni who have become professors or teachers in universities, colleges and schools in nearly every State in the Union, as well as in Europe and Asia. Of its doctors of philosophy 87 per cent. and of its bachelors of arts 27 per cent. have become teachers, the number amounting to no less than 514 in the short period of sixteen years.

### WASHINGTON COLLEGE.

Though various desultory attempts had been made to establish a college in Maryland in colonial times, nothing was effected until 1780, when Dr. William Smith, ex-president of what is now the University of Pennsylvania, came to Chestertown, in Kent county, and opened "a

school for instruction in the higher branches of education." His attempt being very successful, the Legislature, two years later, granted the school a charter as Maryland's first college, and named it "in honorable and perpetual memory" of Washington. Assisted by the State, Washington College flourished for a number of years, after which, from the withdrawal of State aid and other misadventures, it had a somewhat checkered career. It is now, however, fairly prosperous, and has a faculty of seven instructors and 117 students. Since 1890 young women have been admitted to its courses. It is the only college on the Eastern Shore.

### ST. JOHN'S COLLEGE.

As previously stated, this college is a continuation of the oldest public school in Maryland—King William School, founded in 1696—and is situated in Annapolis, the capital. It was raised to collegiate rank in 1784, to be for the Western Shore what Washington College was for the Eastern. Its first quarters were in the house built by Governor Bladen, in colonial times, as his official residence, which still remains as McDowell Hall, so named from the first president.

It had a prosperous career until the withdrawal of the State appropriation in 1805, after which it languished and for a while was closed. A new era, however, began for it under the presidency of the Rev. Hector Humphreys, who devoted himself to its rehabilitation. He reorganized the system of instruction, traveled in its interests, raised funds for two more buildings, prevailed on the Legislature to renew the appropriation, and worked faithfully in its behalf until his death in 1857.

During the civil war it was closed and the buildings used as a hospital, but it was reopened in 1866. The present president, Thomas Fell, LL.D., was appointed in 1887. The faculty consists of fifteen members and the students number 182. The grounds, upon which the college buildings stand, comprise twenty acres. In the College library may be found an interesting collection of books, the gift of King William III. to the school that bore his name. The college is in close and friendly relations with Johns Hopkins University, where its certificated students are received without further examination.

### MOUNT ST. MARY'S COLLEGE.

This was founded in 1808 at Emmittsburg, Frederick county, by the Rev. Jean Dubois, a priest of the Roman Catholic Church, who had emigrated from France in 1797. It was at first under the control of the Sulpician Order, but is now governed by the secular clergy, the Rev. Edward P. Allen being the president. In addition to the regular collegiate curriculum, there is a commercial course and a preparatory department. An ecclesiastical seminary preparatory to the priesthood is also maintained.

NEW WINDSOR COLLEGE.

This college, situated at New Windsor, Carroll county, was founded in 1843. It is under the control of the Presbyterian Church. Both sexes are instructed, but separately, in different courses of study. It has also a commercial department.

LOYOLA COLLEGE.

This was opened in 1852 in its present situation on Calvert street, Baltimore. It is under the control of the Jesuit order, and its course of study is similar to that of other Jesuit colleges. A commercial course is also given, and a preparatory school maintained.

ROCK HILL COLLEGE.

The Brothers of Christian Schools, a Roman Catholic fraternity, founded two centuries ago by Jean Baptiste de la Salle, purchased in 1857 the Rock Hill Academy at Ellicott City, Howard county, and procured a college charter in 1865. Three courses of study are given: A classical and a scientific course, each of four years, and a commercial course of two years. It has a preparatory department.

WESTERN MARYLAND COLLEGE.

This college, under the control of the Methodist Protestant Church, was incorporated in 1868. It is unsectarian and receives students of any denomination. Both sexes are received, but follow different courses. The male and female students are separated in the chapel and dining hall, but meet once a month socially in the reception parlors. This college, though not endowed, has been especially prosperous in late years, and has increased the area of its grounds and added new buildings. The Rev. Thomas H. Lewis is president, with a faculty of eighteen members. The students number two hundred and fifty-eight.

THE WOMAN'S COLLEGE OF BALTIMORE.

The Woman's College is an institution founded by the Methodist Episcopal Church for the higher education of women. It was incorporated in 1884, and opened in 1888, but did not send forth any graduates until 1892.

Its buildings, of massive granite, are in the northern part of the city, at and near the junction of St. Paul and Twenty-second streets. The main building, called Goucher Hall, in honor of the president, the Rev. John F. Goucher, D.D., to whose zealous labors and lavish generosity the success of the whole foundation is largely due, immediately adjoins the First Methodist Church, which serves as the college chapel, being connected with Goucher Hall by a bridge. On the other side stands Bennett

FIRST METHODIST EPISCOPAL CHURCH — GOUCHER HALL — BENNETT HALL

THE WOMAN'S COLLEGE OF BALTIMORE.

SOUTHERN HALF OF CAMPUS.

Hall, given by Mr. B. F. Bennett, of Baltimore, in memory of his wife, and used as the gymnasium—one of the most extensive in the world for the exclusive use of women, containing all the best modern appliances, as swimming-pool, &c. The physical culture department is in charge of a professor who is a doctor of medicine, and the Swedish system of training is used, the instructors being graduates of the Royal Institute of Stockholm. The resident students live in three handsome buildings erected for the purpose in the vicinity of the college, and arranged and fitted up with the most careful attention to health and comfort. It has also a preparatory department, the Girls' Latin School, with a separate corps of instructors.

In 1892, there were 208 students in the preparatory school and 124 in the College, of whom only 55 were from Baltimore.

The funds of the Male Free School, founded in 1802, and of the Colvin Institute for Girls, founded in 1839, were transferred to this College in 1890, the public schools having superseded the older foundations; and these funds have been applied to the creation of scholarships.

### MORGAN COLLEGE.

This institution, situated on Fulton avenue, Baltimore, is for the education of colored youth. It was chartered in 1889.

### PRIVATE SCHOOLS.

In addition to the school system of State, county and city, there are many valuable schools in Maryland, under the control of private corporations or supported by private liberality. Of these only a few can be mentioned. In St. Mary's county is Charlotte Hall, founded in 1774; in Frederick county, Frederick College, founded in 1763, and receiving its present charter in 1830; in Montgomery, the Rockville Academy, chartered in 1808; in Allegany, the Allegany County Academy, founded in 1800; in Queen Anne's, the Centreville Academy, chartered in 1793; in Cecil, the West Nottingham Academy, beside others.

Calvert Hall, in Baltimore city, is managed by the Brothers of Christian Schools, a fraternity of the Roman Catholic Church, and is the preparatory department of Rock Hill College, Howard county, belonging to the same Order. It occupies a large and handsome building at the corner of Cathedral and Mulberry streets.

The McDonogh Institute and Farm School is situated on the Western Maryland Railroad, 9 miles from the city. It was founded by John McDonogh, a wealthy merchant of Baltimore and New Orleans, who, at his death in 1850, left half his fortune for its establishment, though owing to tedious litigation, it was not opened until 1875. This school has been organized and carried out in strict accordance with the instructions

of its founder. On a farm of 835 acres, 110 boys live in one great family. They perform all the lighter farm work, and receive manual training in machine and carpenter shops. Literary studies are not neglected, and graduates of the school are prepared to enter college. The boys edit and print a paper of their own called "The Week." This institution has been fortunate in its excellent superintendents, and admission to it is much sought after.

The Oliver Hibernian Free School, on North street, Baltimore, was founded by a bequest of John Oliver, a Baltimore merchant, in 1823, as a free school for poor children of Irish parentage.

The Jacob Tome Institute of Port Deposit, Cecil county, was endowed in 1889 by Mr. Tome with $2,500,000, but has not yet been opened. It is intended for the free education of white children from ten to eighteen years of age.

For the education of girls and young women many excellent institutions are provided in the city and State. Among them are the Frederick Female Seminary, in Frederick county, founded in 1841, which has just passed under the control of the Reformed Church in the United States; the Hannah More Academy, at Reisterstown, in Baltimore county, founded in 1838, under the control of the Protestant Episcopal Church, and the Lutherville Seminary, at Lutherville, in Baltimore county, founded in 1853, under the control of the Evangelical Lutheran Church.

The Bryn Mawr School, preparatory to Bryn Mawr College, was founded in 1889, largely through the liberality of Miss Mary Elizabeth Garrett, whose philanthropy has already been mentioned in these pages. It occupies a fine and substantial building at the corner of Preston and Cathedral streets, and is fitted up with the best modern appliances for instruction and exercise.

Under the control of the Roman Catholic Church are the Academies of Notre Dame, St. Agnes, and Mount de Sales, in Baltimore county; St. Joseph's Seminary at Emmittsburg, Frederick county, and the Academy of the Visitation, in Baltimore.

Beside those mentioned, there are many excellent private schools in the city and the counties, so that, population and wealth being considered, Maryland enjoys facilities for education not inferior to those of any of her sister States.

## THEOLOGICAL SEMINARIES.

### ST. MARY'S SEMINARY OF ST. SULPICE.

When the revolution in France threatened the destruction of all the religious orders, the Rev. André Emery, Superior General of the Society of St. Sulpice, thought of seeking an asylum for his society in America. After a conference in England with the Rev. John Carroll, first Roman

### COLLEGE OF PHYSICIANS AND SURGEONS.

This medical school was incorporated in 1872 by a number of physicians who had been members of the faculty of Washington University, which was finally absorbed by the younger institution. It now has charge of the new City Hospital at the corner of Calvert and Saratoga streets, which contains three hundred beds, and is managed by the Sisters of Mercy. Connected with the hospital is a dispensary, and a building for the reception of colored patients. It also controls the Maryland Lying-in Asylum. The city aids the dispensary with a yearly appropriation, and pays an annual sum for beds in the hospital. The State also gives assistance to the College, which has a faculty of ten members, and gives a three years' course of study.

### BALTIMORE MEDICAL COLLEGE.

This, the third Baltimore medical school in point of age, was organized in 1881. Its earlier growth was slow, but after certain changes were effected in its organization, and the removal to a new site, it prospered. In 1892, it erected a handsome building on the corner of Madison street and Linden avenue. It has a faculty of eleven professors and nine assistants. It controls the Maryland General Hospital connected with its buildings, which receives assistance from both State and city. The city gives also an annual sum to its dispensary.

### BALTIMORE UNIVERSITY SCHOOL OF MEDICINE.

This was founded in 1884, and is situated on Bond street, East Baltimore. Its charter endows it with full University powers, and it has lately added dental, veterinary and law departments to the original medical school. In 1891 it numbered one hundred and twenty-four students. Its dispensary and hospital receive an annual sum from the city.

### SOUTHERN HOMŒOPATHIC MEDICAL COLLEGE.

This was opened in 1890, and occupies a building on Saratoga street, near Charles. It controls the Maryland Homœopathic Free Dispensary and Hospital on North Paca street.

### WOMAN'S MEDICAL COLLEGE.

In 1882, was organized the first school in Baltimore which provided medical education for women. It is situated at the corner of Hoffman and McCulloh streets. Its course is as thorough as those given in the other colleges. The faculty numbers twelve professors. It controls the Hospital of the Good Samaritan, on Hoffman street, and receives aid from both State and city for its hospital and dispensary.

### REDEMPTORIST COLLEGE.

This institution, whose exact name is House of Studies of the Congregation of the Most Holy Redeemer, Mt. St. Clement, was founded in 1867 at Ilchester, Howard county, by the Redemptorist Congregation of the Roman Catholic Church, as a school to prepare members of their body for the priesthood. The course of study covers six years, and includes philosophy, natural science, biblical study, theology, canon law and church history. The rector is the Rev. Eugene Dumont.

### WESTMINSTER THEOLOGICAL SEMINARY.

This seminary is designed to educate young men for the ministry of the Methodist Protestant Church. It occupies a building on the grounds of the Western Maryland College, Westminster, and is closely connected with that institution, though it has a separate legal existence. The Rev. J. T. Ward, D.D., is the president.

### THEOLOGICAL SEMINARIES FOR COLORED MEN.

Several seminaries have been established to prepare colored men for the ministry of the Gospel, among which are the Theological Department of Morgan College, in Baltimore, belonging to the Methodist Episcopal Church, and Epiphany Apostolic College and St. Joseph's Seminary, also in Baltimore, belonging to the Roman Catholic Church.

## MEDICAL COLLEGES.

### UNIVERSITY OF MARYLAND.

The medical faculty of this, the oldest school of medicine in the State, has already been spoken of under the head of universities.

### MEDICAL AND CHIRURGICAL FACULTY OF MARYLAND.

In 1799 the Legislature incorporated this venerable body for the purpose of "promoting and disseminating medical and chirurgical knowledge throughout the State, and preventing the citizens thereof from risking their lives in the hands of ignorant practitioners or pretenders to the healing art." It was rather an examining than a teaching body, and was invested with power to give certificates to competent practitioners, which certification was made obligatory. This provision afterwards fell into disuse, and no examination of physicians was made until the passage of the act of 1892. The membership comprises some of the most distinguished physicians of the State. It holds semi-annual meetings at its rooms at the corner of St. Paul and Saratoga streets, Baltimore, where it has a valuable library. An annual volume of transactions is published.

### COLLEGE OF PHYSICIANS AND SURGEONS.

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### MARYLAND COLLEGE OF PHARMACY.

This was incorporated in 1841, but did not succeed until reorganized in 1856, since which time it has steadily grown in attendance and reputation. In 1886, it erected its present building at the corner of Fayette and Aisquith streets. It gives a two years' course, leading to the degree of Graduate in Pharmacy. The college is conducted by an association of pharmacists, of whom Dr. E. Eareckson is president.

### BALTIMORE COLLEGE OF DENTAL SURGERY.

This was chartered in 1839, and is the oldest dental college in the world. It is located at the corner of Franklin and Eutaw streets, where it has well-appointed lecture-rooms, laboratories, and infirmary. The course extends over two years, and covers the whole field of operative and mechanical dentistry with the cognate studies. R. B. Winder, M.D., is the president.

## OTHER EDUCATIONAL AND LITERARY INSTITUTIONS.

### THE PEABODY INSTITUTE.

This institution, of which Baltimore is justly proud, is due to the munificence of Mr. George Peabody, who in the earlier part of his life had been a citizen of Baltimore, where he laid the foundation of his large fortune. In 1857, after he had long been a citizen of London, he had matured the plan of an institution which should advance the culture of a city toward which he felt a filial affection. His design was embodied in a letter addressed to twenty-five gentlemen whom he had selected as trustees, in which he announced an endowment of $300,000 as the first instalment of his gift, which he afterward increased to $1,240,000. The plan included a free public library, a conservatory of music, a gallery of fine art, provision for public lectures, and a system of premiums to the high schools of the city.

The site selected is one of the finest in the city, on the hill at the intersection of Charles and Monument streets, at the foot of the Washington Monument. The building was begun in 1858, and the west wing was finished in 1861 and the library begun. The institute was formally opened in 1866 in the presence of the founder. John G. Morris, D.D., was the first librarian. On his resignation, N. H. Morison, LL.D., was appointed executive head of the institute with the title of Provost, which office he held until his death in 1890, when he was succeeded by P. R. Uhler, the present Provost. The building has been completed by the addition of the central portico and east wing, and has now a front of one hundred and seventy-five feet. It is built of white marble, and the style is Italian Renaissance, of tasteful design.

The institute has three halls for public lectures, concerts, etc., a gallery of art and a conservatory of music. The library occupies the entire east wing and contains 116,000 volumes, with space for 500,000. The library is for reference and consultation, and is of remarkable excellence, every department of knowledge and letters being well represented. Admission is free to all. The art gallery contains a choice collection of paintings, largely the gift of the late Mr. John W. McCoy, who also enriched the collection with works from the chisel of Rinehart, the sculptor, whose genius Mr. McCoy recognized and assisted, and to whom he was ever a warm and generous friend. Chief among these works is the exquisite ideal statue of Clytie, the artist's masterpiece. The gallery will be further enriched by a valuable collection of paintings, miniatures, medallions, bronzes and statuary, received from the estate of the late Mr. Charles J. M. Eaton, of Baltimore. There is also a gallery of casts from the antique and other more modern great works, presented by the late Mr. John W. Garrett. The conservatory of music occupies a large part of the west wing, and is under the direction of Mr. Asgar Hamerik, K.D. Advanced instruction in all branches of music is given by a corps of professors, and diplomas are conferred. In connection with this department, musical recitals, students' concerts, and symphony concerts are given.

A course of thirty lectures is given during the fall and winter by lecturers of distinction, at a price of admission little more than nominal.

The Institute also gives yearly medals and premiums to the most meritorious graduates of the Maryland Institute and of the city high schools, so that its beneficent influences are felt in many ways.

### MARYLAND INSTITUTE FOR THE PROMOTION OF THE MECHANIC ARTS.

This institution was founded in 1826, but after an existence of nine years its building was destroyed by fire, and its activity ceased. It was revived in 1848, in which year a night school was opened, to which a day school was added in 1854. Its building is on East Baltimore street, the lower story being an open arcade, forming the continuation of the Centre Market.

In the day school is given a four years' course in drawing, painting and modeling. The night school has three divisions, comprising free-hand, mechanical and architectural drawing. A commercial school also is open for six months in the year.

Thirty-five scholarships are offered to residents of Baltimore and twenty-three to students from other parts of the State. During its existence it has enrolled over 17,000 students. The attendance in the winter of 1892-93 was 1,021, of whom 715 were in the night, 222 in the day and 84 in the commercial schools. It has a reading-room and library of 20,000 volumes. The State and city each appropriate $6,000 annually to

its support. The will of George Peabody endowed it with a fund for the annual distribution of prizes to the value of $500. The president is Mr. Joseph M. Cushing.

### MARYLAND AGRICULTURAL COLLEGE.

This college, chartered in 1856, was the first in the country to recognize agricultural experimentation as an important part of its operations; it is the second agricultural college and third agricultural school opened in the United States, and the only one founded by voluntary subscription. It is situated in Prince George's county, eight miles from Washington city.

In 1862, the Federal government began to make appropriations for agricultural colleges, of which this institution receives a share; and when, in 1887, Congress passed an act for establishing agricultural experiment stations, Maryland's station was organized in connection with this college. It has also received aid from the State. The course of study includes agriculture, horticulture, history, natural history, English, mathematics and political economy, with optional courses in languages. Tuition and lodging are free. Military drill is given to the students, who are organized into a battalion.

### MARYLAND ACADEMY OF SCIENCES.

This association, organized in 1863, devoted itself especially to the illustration of the flora, fauna, geology and mineralogy of the State. Its collections were very valuable, but for lack of support it fell into a languishing state, and transferred its specimens to the museum of Johns Hopkins University. Within the past year Mr. Enoch Pratt has presented to the association a commodious building at the corner of Franklin and Cathedral streets, and it will now carry on its instructive and valuable work under more fortunate auspices.

### MARYLAND HISTORICAL SOCIETY.

The object of this society, which was organized in 1844, is the collecting and preserving materials relating to the history of the State, and by publications, addresses, &c., quickening interest in historical studies. Its collection of manuscripts and rare publications illustrating the early history of the colony and State, and of other historical relics, is of singular interest and value. It has a very valuable library of about 30,000 volumes, particularly rich in Americana.

The Legislature has appointed this society the custodian of the ancient archives of the State, from the earliest colonial period down to the peace with Great Britain in 1783, and for several years has made an appropriation for their publication, eleven quarto volumes having already

appeared. The society has also a publication fund left it by the late George Peabody, from the income of which it has published thirty-two historical and biographical monographs. It owns and occupies the Athenæum Building at the corner of St. Paul and Saratoga streets, in the upper story of which is the gallery of paintings and portraits, which is open to the public without charge, as are also the other rooms of the society. The president is the Hon. S. Teackle Wallis.

### THE ENOCH PRATT FREE LIBRARY.

This library owes its existence to the bounty of Mr. Enoch Pratt, a native of Massachusetts, but a resident of Baltimore since 1831, and one of its most prosperous merchants. In 1882 Mr. Pratt laid his plans for a free public library before the Mayor and City Council, and carried them out by the erection, at a cost of $250,000, of a handsome building for the main library on Mulberry street, near Cathedral, and of four branch libraries in other parts of the city at a cost of $50,000. In pursuance of his design, Mr. Pratt gave the city the sum of $833,333, on condition of the city's creating, in favor of the library, a perpetual annuity of $50,000, payable to a co-optative Board of Trustees, selected in the first instance by the donor.

The central building is of white marble, in a bold Romanesque style, embellished with handsome sculpture and mouldings, and has a front of eighty-two feet with a depth of one hundred and forty-two. The books are housed in the lower story, and delivered by attendants as called for at the office. The second story contains the reading room, librarian's room, &c.

This building was turned over to the Trustees in 1884. The library, organized under the direction of Lewis H. Steiner, M. D., librarian, was opened to the public in January 1886. Dr. Steiner died in 1892, and was succeeded by his son, Bernard C. Steiner, Ph. D., the present librarian.

During 1892 the circulation was 452,733 volumes, and on July 1, 1893, there were 82,265 volumes on the shelves of the central library, and 47,007 on those of the five branches, a fifth branch having been added in 1888. Any resident of the city above the age of fourteen may draw books after having been registered, and having furnished a guarantor, and sojourners have the privilege of drawing books on condition of a small cautionary deposit.

### THE NEW MERCANTILE LIBRARY.

The old Mercantile Library, founded in 1839, having fallen into difficulties after a long career of usefulness, was closed in 1886, and the books purchased by an association of gentlemen who determined to put

it on a better footing and reawaken public interest in it. The rooms were newly furnished and decorated, and the shelves supplied with new and attractive books. The fears of many that a free circulating library would make a subscription library impossible were not realized, and it was soon placed on a sound basis. It now contains over 20,000 volumes, and circulates 60,000 yearly. It is situated on Charles street, near Saratoga, and its pleasant reading-room, supplied with the best periodicals, is a favorite resort of ladies.

### OTHER LIBRARIES.

The Whittingham Memorial Library, containing about 20,000 volumes, left by the late Bishop Whittingham to the Maryland Diocese of the Protestant Episcopal Church and preserved at the Episcopal residence on Madison avenue, is a valuable collection, especially of theological works. The Bar Library, maintained by the members of the Baltimore bar, contains over 10,000 volumes. It is preserved in the upper floor of the Equitable building. The Independent Order of Odd Fellows have in their hall about 22,000 volumes, accessible to members of the Order.

The City Library, at the City Hall, contains nearly 12,000 bound volumes, besides the municipal reports, pamphlets, &c.

It is safe to say that within a circle of a half-mile radius in Baltimore there are half a million of books, to which students or investigators can have access and which cover every department of human thought.

Outside of Baltimore the principal library not attached to a religious or educational institution is the State Library at Annapolis.

### THE YOUNG MEN'S CHRISTIAN ASSOCIATION.

This, though primarily a religious body, has also educational features, and classes in German, mathematics, book-keeping and other subjects are conducted at its central building, on the corner of Charles and Saratoga streets, and at its five branches. It has gymnasia and grounds for open-air athletics. Lectures and instructive entertainments are also given.

### THE YOUNG MEN'S HEBREW ASSOCIATION

was organized in 1890. Its rooms on Eutaw street are provided with a gymnasium, reading-rooms, &c., and it is proposed to organize educational classes. Lectures are given in the winter.

### THE CHARCOAL CLUB

was founded by a company of artists and lovers of art for the promotion of art in Baltimore and for social purposes. In their rooms, at the corner of Howard and Franklin streets, both day and night classes in drawing, &c., are conducted, and exhibitions are given.

### WALTERS ART GALLERY.

This, probably the choicest art collection in the United States, is the property of William T. Walters, Esq., of Baltimore, and is contained in his house on Mount Vernon Place. It consists of a gallery of paintings by modern masters, a collection of rare oriental porcelains, ivories, and lacquers from China and Japan, a collection of bronzes by Barye, old carved furniture, and other objects of art.

The paintings, which have been selected by Mr. Walters with the most refined taste, and many of which have been executed for him, represent the most characteristic work of the masters of the French, German, English and American schools.

The oriental collection comprises porcelains and potteries of the rarest and most beautiful designs, of all ages, illustrating the history of the art for centuries; exquisite works in metal, quaint and delicate carvings in ivory and wood, &c. Thousands of precious and curious objects are arranged in the various rooms.

Though a strictly private gallery, Mr. Walters opens it to the public on certain days in February, March and April, for a small admission fee, the proceeds being given to a public charity.

## CHAPTER XV.

### THE POPULATION OF MARYLAND.

For the first one hundred and fifty-six years after the landing of the pilgrims from the Ark and the Dove, there are no trustworthy statistics of the population of Maryland. Vague guesses as to the number of inhabitants were occasionally made, and in the latter part of the colonial period, and during the interval between the Declaration of Independence and the adoption of the Federal Constitution, several more or less careful official estimates of population were put forth.

In the following table some of these guesses and estimates are reproduced, while for purposes of comparison the population in 1790, as returned by the first Federal Census, is also given:

| Date of Estimate. | Population. | Increase. | Percentage of increase. | Number years between estimates. | Date of Estimate. | Population. | Increase. | Percentage of increase. | Number years between estimates. |
|---|---|---|---|---|---|---|---|---|---|
| 1634....... | 200 | ........ | ........ | ........ | 1756....... | 154,188 | 24,188 | 18.60 | 8 |
| 1660....... | 12,000 | 11,800 | 5900.00 | 26 | 1760....... | 166,523 | 12,335 | 8.00 | 4 |
| 1671....... | 20,000 | 8,000 | 66.67 | 11 | 1770....... | 199,827 | 33,304 | 20.00 | 10 |
| 1701....... | 25,000 | 5,000 | 25.00 | 30 | 1775....... | 225,000 | 25,173 | 12.60 | 5 |
| 1715 ..... | 30,000 | 5,000 | 20.00 | 14 | 1782....... | 254,050 | 29,050 | 12.91 | 7 |
| 1748 ...... | 130,000 | 100,000 | 333.33 | 33 | 1790....... | 319,728 | 65,678 | 25.85 | 8 |

While it would be very unsafe to base any nice calculations upon data the accuracy of which is as uncertain as is that of most of the above figures, it would seem that the general belief at the time was, that in the almost half century between 1671 and 1715 the increase of population was slow, while subsequent to 1715 it was relatively rapid. For the last century the eleven censuses of the United States thus far taken supply us with definite and reasonably accurate figures for a study of the absolute gain in population and for a comparison of rates of increase in this and in the other older States. In all such comparisons, however, the small area of Maryland must be kept constantly in mind.

In point of territorial extent the original thirteen States divide themselves into two classes. The six States of New York, Pennsylvania, Virginia, the Carolinas and Georgia are relatively large, the smallest of them covering an area more than three times as extensive as that of the largest of the other seven. Maryland, with a land surface of 9,860 square miles, stands at the head of the seven small States of Maryland, New

**Hampshire, Massachusetts, New Jersey, Connecticut, Delaware and Rhode Island. Ever since the Union was formed, Maryland has been one of the more densely peopled members of the sisterhood. In 1790, when the first census was taken, with 32 inhabitants to the square mile, only Rhode Island, Connecticut and Massachusetts surpassed it in the average density of settlement. In 1890 the eleventh decennial enumeration showed that it had 105 inhabitants for every square mile of its land surface, and in this respect it was outranked by Rhode Island, Massachusetts, New Jersey, Connecticut, New York and Pennsylvania alone.**

**The area of the State having of course remained the same, it is obvious that the aggregate population has in the course of the century been multiplied more than three-fold. Both absolutely and relatively the increase of population has been much more rapid during the latter than during the former half of the century. Until subsequently to 1840, when the great flood of immigrants began to pour into this country, the population of most of the smaller, and, in 1790, more densely populated States increased but slowly. In the fifty years from 1790 to 1840 the population of Maryland rose from 319,728 to 470,019, a gain of only 150,291, or at the rate of but 47.00 per cent. On the other hand, so soon as the Irish famine, the political troubles in Germany, and other causes gave impetus to the movement from Europe to America, which has ever since been going on, the population began to multiply with great rapidity, and in 1890 the State contained 1,042,390 souls, an increase in the half century since 1840 of no less than 572,371, or at a rate, 121.77 per cent., more than two and a-half times as great as in the preceding fifty years.**

**In the table below will be found the population of the State according to each Federal Census, the increase and the percentage of increase during each decade, the increase and the percentage of increase since 1790, the number of inhabitants to the square mile at the date of each census and the increase in each decade in the number of inhabitants to the square mile.**

| Date of Census | Aggregate Population. | Increase During Decade. | Increase Since 1790. | Percentage of Increase During Decade. | Percentage of Increase Since 1790. | Number of inhabitants to each square mile of land surface | Increase in the number of inhabitants to each square mile of land surface during decade. |
|---|---|---|---|---|---|---|---|
| 1790 | 319,728 | ...... | ...... | ...... | ...... | 33.4 | ...... |
| 1800 | 341,548 | 21,820 | 21,820 | 6 8 | 6 8 | 34.6 | 2 2 |
| 1810 | 380,546 | 38,998 | 60,818 | 11.4 | 19 0 | 38.6 | 4.0 |
| 1820 | 407,350 | 26,804 | 87,623 | 7.0 | 27.4 | 41 3 | 2.7 |
| 1830 | 447,040 | 39,690 | 127,312 | 9.7 | 39 8 | 45.3 | 4.0 |
| 1840 | 470,019 | 22,979 | 150,291 | 5 1 | 47.0 | 47 7 | 2.4 |
| 1850 | 583,034 | 113,015 | 263,306 | 24.0 | 82.3 | 59.1 | 11.4 |
| 1860 | 687,049 | 104,015 | 367,331 | 17.8 | 114.0 | 69.6 | 10.5 |
| 1870 | 780,894 | 93,845 | 461,166 | 13.7 | 144.2 | 79.1 | 9.5 |
| 1880 | 934,943 | 154,049 | 615,215 | 19.7 | 192.4 | 94.8 | 15.7 |
| 1890 | 1,042,390 | 107,447 | 722,662 | 11.5 | 226.00 | 105.7 | 10.9 |

**In Maryland, as in most other portions of the civilized world, the urban population is and has been increasing very much more rapidly than the rural. In 1790 only one Marylander in twenty-three resided in the limits of what was then officially styled Baltimore Town, while in 1890 the City of Baltimore contained more than two-fifths of the population of the entire State. Of the aggregate increase of 722,000 in the population of Maryland during the century, more than four-sevenths is to be credited to Baltimore City alone. The way in which, in common speech, Maryland is divided into "The City," by which Baltimore is, of course, meant, and "The Counties," in which are comprised all of the State outside of Baltimore, is in itself a striking evidence of the large place Baltimore necessarily occupies in any study of Maryland.**

### THE COUNTIES AND BALTIMORE CITY.

**In the following table will be found the population of "The City" and "The Counties" according to each Federal Census, the increase and the percentage of increase in the population of each during each decade, and the total increase and the percentage of increase in each since 1790.**

| Date of Census. | Population. | | Percentage of total population of State residing in | | Increase in decade. | | Percentage of increase in decade. | | Increase since 1790. | | Percentage of increase since 1790. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baltimore City. | The Counties. | City. | Counties. | City. | Counties. | City. | Counties. | City. | Counties. | City. | Counties. |
| 1790 | 13,503 | 306,225 | 4.22 | 95.78 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| 1800 | 26,514 | 314,984 | 7.79 | 92.21 | 13,011 | 8,759 | 97.09 | 2.86 | 13,011 | 8,759 | 97.09 | 2.86 |
| 1810 | 46,555 | 333,991 | 12.23 | 87.77 | 19,941 | 19,007 | 74.46 | 6.03 | 33,052 | 27,766 | 244.78 | 9.07 |
| 1820 | 62,738 | 344,612 | 15.40 | 84.60 | 16,183 | 10,621 | 34.76 | 3.18 | 49,235 | 38,387 | 364.62 | 12.54 |
| 1830 | 80,625 | 366,415 | 18.04 | 81.96 | 17,887 | 21,803 | 28.51 | 6.33 | 67,122 | 60,190 | 497.09 | 19.65 |
| 1840 | 102,313 | 367,708 | 21.77 | 78.23 | 21,688 | 1,293 | 26.90 | .35 | 88,810 | 61,483 | 657.71 | 20.08 |
| 1850 | 169,054 | 413,980 | 29.00 | 71.00 | 66,741 | 46,272 | 65.23 | 12.58 | 155,551 | 107,755 | 1151.97 | 35.19 |
| 1860 | 212,418 | 474,631 | 30.92 | 69.08 | 43,364 | 60,651 | 25.65 | 14.65 | 198,915 | 168,406 | 1473.12 | 54.99 |
| 1870 | 267,354 | 513,540 | 34.24 | 65.76 | 54,936 | 38,909 | 25.86 | 8.20 | 253,851 | 207,315 | 1879.90 | 67.70 |
| 1880 | 332,313 | 602,630 | 35.54 | 64.46 | 64,959 | 89,090 | 24.30 | 17.35 | 318,810 | 296,405 | 2361.18 | 96.79 |
| 1890 | 434,439 | 607,951 | 41.68 | 58.32 | 102,126 | 5,321 | 30.73 | .88 | 420,936 | 301,726 | 3117.33 | 98.53 |

In comparing 1790 with 1890 it is unnecessary to take into account the fact that within the century there have been various extensions of the city limits, for the number of inhabitants, who, at the earlier date, resided in the territory, which was not then, but is now, within the corporate boundaries, must have been both relatively and absolutely small, but in contrasting one census with another immediately succeeding or preceding it, the fact that the lines separating the municipality from the surrounding country have been changed in the intervening decade, may, of course, seriously affect the apparent relative rates of growth in

population between the two federal enumerations of "The City" and of "The Counties."

Thus in 1888 there was annexed to the city a territory which in 1880 contained, probably, 25,000 inhabitants. Treating this territory for purposes of comparison, as having been part of the city in 1880, as it was in 1890, the total increase in the population of "The Counties" in the decade was 30,321, or nearly five per cent., while the increase in the city was 77,126, or more than twenty-three per cent.; a great difference, but still a much less extensive one than the above table would indicate. On the other hand, in the twenty years between 1860 and 1880, during which the population of this surrounding "Belt" of Baltimore was rapidly multiplying as part of the city's growth, the increase went to the credit of "The Counties," although it really belonged to "The City."

Probably many, if not most well informed people, familiar as they are with the generally depressed state of agricultural industry of late years, will be surprised to learn that, as the table shows, the growth of rural Maryland in population has been much more rapid during the later than during the earlier half of the century which has elapsed since the first census was taken. In the fifty years between 1790 and 1840, Maryland, outside of Baltimore City, added but twenty per cent. to its population, while since 1840 the increase has been more than three times as rapid, or at the rate of more than sixty-five per cent.

Compared with the counties the City of Baltimore is still quite a youth; and, as a not uncommon result of its having been relatively small when the basis of representation was first established in the new State, it has still a very much feebler voice in the General Assembly of the Commonwealth than its numbers, to say nothing of its wealth, would seem to entitle it, for while it now contains, as above set forth, no less than 41.68 per cent. of the entire population of the State, it elects less than eighteen per cent. of the membership of the State Legislature.

### THE EASTERN AND THE WESTERN SHORES.

The two great geographical divisions of the State are the Eastern and Western Shores. In colonial days, and for many years following the Declaration of Independence, this division was recognized for many administrative and political purposes, and down to the present day one United States Senator is always chosen from among the residents of the Eastern and the other from among those of the Western Shore.

Leaving out Baltimore City altogether, the following table will show the relative growth of the counties of the Eastern and of the Western Shores:

| Date of Census. | Population. | | Increase during decade. | | Percentage of increase during decade. | | Increase since 1790. | | Percentage of increase since 1790. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Western Shore, exclusive of Balto. City. | Eastern Shore. | Western Shore. | Eastern Shore. | Western Shore. | Eastern Shore. | Western Shore. | Eastern Shore. | Western Shore. | Eastern Shore. |
| 1790 | 198,586 | 107,639 | | | | | | | | |
| 1800 | 206,552 | 108,382 | 7,966 | 743 | 4.01 | .69 | 7,966 | 743 | 4.02 | .67 |
| 1810 | 216,870 | 117,121 | 10,318 | 8,739 | 5.00 | 8.06 | 18,284 | 9,482 | 9.21 | 8.81 |
| 1820 | 222,903 | 121,709 | 6,033 | 4,588 | 2.78 | 3.92 | 24,317 | 14,070 | 12.25 | 13.06 |
| 1830 | 246,943 | 119,472 | 24,040 | *2,237 | 10.79 | *1.84 | 48,357 | 11,833 | 24.35 | 10.99 |
| 1840 | 250,375 | 117,331 | 3,432 | *2,141 | [illegible] | *1.79 | 51,789 | 9,692 | 26.08 | 8.99 |
| 1850 | 285,478 | 128,504 | 35,103 | 11,173 | 14.02 | 9.52 | 86,892 | 20,865 | 43.76 | 19.38 |
| 1860 | 329,505 | 145,128 | 44,027 | 16,624 | 15.43 | 12.93 | 130,917 | [illegible] | 65.93 | 34.82 |
| 1870 | 356,288 | 157,254 | 26,783 | 12,126 | 8.12 | 8.36 | 157,700 | 49,615 | 79.42 | 46.08 |
| 1880 | 423,498 | 179,134 | 67,210 | 21,880 | 18.56 | 13.91 | 224,290 | 71,415 | 113.27 | 66.41 |
| 1890 | 423,854 | 184,097 | 356 | 4,963 | .09 | 2.77 | 225,266 | 76,458 | 113.45 | 71.08 |

*Decrease.

During the hundred years covered by the above table, it will be perceived that the Western Shore has grown something over one and a half times as fast as the Eastern. The latter, indeed, as late as 1840, had less than ten per cent. more people than it had had fifty years before, there having been between 1820 and 1840 an absolute decrease. Since the latter date, however, the progress of the Peninsula counties has been steady, and—bearing in mind that they are almost purely agricultural, and are among the earliest settled portions of the original thirteen States—fairly satisfactory. The low apparent rate of increase in the Western Shore during the last decade was caused by the extension in 1888, of the limits of Baltimore city over an area of Baltimore county, which in that year had, as before stated, a population of about 25,000.

### NORTHERN AND SOUTHERN MARYLAND.

On the Western Shore there is, and always has been, quite a marked difference between the southern counties and those which lie further north in the industrial and social conditions, and in the relative proportions of the white and colored elements of the population. While these regions shade into each other by more or less easy stages, still a line drawn along the Patapsco from its mouth, and then west and southwest along the northern boundaries of Howard and Montgomery counties to the Potomac river, will be a fairly accurate dividing line between what is usually called Southern Maryland and what we may for convenience here designate as Northern or Northern and Western Maryland. The

Southern counties were the earlier settled. The Northern have a little more than a third larger area, the land surface of Southern Maryland as above defined, comprising two thousand six hundred and seventy-six square miles, and of Northern Maryland, exclusive of Baltimore city, three thousand six hundred and ninety-five square miles. As the land area of the nine Eastern Shore counties is three thousand four hundred and sixty-one square miles, the division of the Western Shore above suggested, separates the counties of the State into three groups of not very widely different extent.

A hundred years ago there was no great difference in the number of inhabitants of each of these sections. The Eastern Shore then having, as has been before stated, 107,389 inhabitants, Southern Maryland 106,754, and Northern Maryland, Baltimore city always being excluded, 91,832. The circumstance that the section of the State having the largest superficial area had the smallest population, was due to the fact that a large portion of the Western counties were still either an altogether unpeopled wilderness or at best were very thinly settled.

The table below will show the comparative increase in Northern and Southern Maryland since 1790.

| Date of Census. | Population. | | Increase during decade. | | Percentage of increase during decade. | | Increase since 1790. | | Percentage of increase since 1790. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Northern Maryland. | Southern Maryland. | Northern Maryland. | Southern Maryland. | Northern Maryland. | Southern Maryland | Northern Maryland. | Southern Maryland. | Northern Maryland. | Southern Maryland. |
| 1790 | 91,832 | 106,754 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| 1800 | 106,518 | 100,034 | 14,686 | *6,720 | 15 99 | *6.29 | 14,686 | *6,720 | 15.99 | *6 29 |
| 1810 | 110,589 | 106,281 | 4 071 | 6,247 | 3.82 | 6.24 | 18,757 | *473 | 20.42 | *.44 |
| 1820 | 121,575 | 101,328 | 10 986 | *4,953 | 9.93 | *4.66 | 29,743 | *5,426 | 32.39 | *5.08 |
| 1830 | 138,230 | 108,713 | 16,655 | 7,385 | 13.70 | 7.29 | 46,398 | 1,959 | 50 52 | 1.83 |
| 1840 | 147,372 | 103,003 | 9,142 | *5,710 | 6.61 | *5.25 | 55,540 | *3,751 | 60.48 | *3.51 |
| 1850 | 176,168 | 109,308 | 28,796 | 6,305 | 19.54 | 6.12 | 84,336 | 2,554 | 91 84 | 2 39 |
| 1860 | 208,439 | 121,064 | 32,271 | 11,756 | 18.32 | 10.76 | 116,607 | 14,310 | 126.98 | 13.40 |
| 1870 | 235,431 | 120,855 | 26,992 | *200 | 12.95 | *.17 | 143,599 | 14,101 | 156 37 | 13.21 |
| 1880 | 281,600 | 141,896 | 46,169 | 21,041 | 19 61 | 17.41 | 189,768 | 35,142 | 206.65 | 32.92 |
| 1890 | 279,356 | 144,498 | *2,244 | 2,602 | *.80 | 1.83 | 187,524 | 37,744 | 204 20 | 35.35 |

*Decrease.

A hundred years ago the Southern counties had a more numerous population than the Northern. and now the latter have twice as many inhabitants as the former. Every decade has witnessed an increase in the population of the Northern part of the State, the apparent decrease in the decade between 1880 and 1890 being due to the change in the boundaries of Baltimore City.

As in other portions of the State, progress has been both relatively and absolutely more rapid since 1840 than before, the population having

increased but 55,540, or at the rate of 60.48 per cent. between 1790 and 1840, as against an increase of 131,984, or at the rate of 89.56 per cent. since.

For the sixty years between 1790 and 1850 there was, practically speaking, no change in the number of the inhabitants of Southern Maryland. In one decade the census returns would indicate a slight increase and in the next a corresponding decrease.

For the decrease between 1790 and 1800, the cession by Maryland of portions of Prince George's and Montgomery counties to provide a site for the Federal Capital, is at least partly responsible. Since 1850 the population of the Southern counties has increased about one-third, more than half that increase having apparently been in the decade between 1870 and 1880. As to this seemingly abnormal increase in this particular decade, the Southern Maryland counties simply stand in the same position as almost all other sections of the country in which the negro population is relatively large. The changes in the census law and in its administration resulted in 1880, in all the so-called "black belts," in a much fuller and more accurate return of population than had ever been made before.

It will be noted in examining the tables already given that in agricultural sections there are often long periods in which there is no substantial gain in population, and then either as a result of increased transportation facilities, of changes in the methods of farming, or of the springing up of local industries other than purely agricultural, or of several or all these causes combined, the region seems to take a new start, and for a while at least grows rapidly.

In Northern Maryland such a change of conditions took place apparently between 1840 and 1850, following very closely upon the opening of railroad lines, and being contemporaneous with the rush of immigrants from Europe. In Southern Maryland it has been but partially made even yet. It is true that since 1850 there has been a material increase in population, but that increase has been confined entirely to the portions of Prince George's and Montgomery counties lying near Washington or along the railroad lines, and to those portions of Howard and Anne Arundel counties which lie within twenty or twenty-five miles of Baltimore city.

### ST. MARY'S, CHARLES AND CALVERT.

The remaining counties of Southern Maryland, St. Mary's, Charles and Calvert, are historically and socially among the most interesting portions of the State. With the exception of Claiborne's trading-post on Kent Island, the earliest settlements in the State were made in them. During the days when tobacco was the great and almost the only

source of provincial wealth, these counties were among the richest and most prosperous in the entire colony. In them, too, was to be found a nearer approach to the plantation system of the more Southern commonwealths than existed elsewhere in Maryland.

Unfortunately for the permanence of their early prosperity, both along the Potomac to the south and west, and the Chesapeake to the east of them, navigable water extended far past them, and towns and cities naturally sprang up at the heads of navigation, at which places, of course, the land haul from the interior to the seaboard was the shortest. The great wagon routes, and subsequently the railroad lines from the West to the Atlantic ports, and from the North to the South along the coast, ran to and between the great shipping ports and centres of population; and these counties lying as they do off both the direct lines of travel from the West to Baltimore and Washington, and the roads running southwest along the coast from Boston, New York and Philadelphia have long suffered from their isolation and lack of facilities for transportation. Under such circumstances they have been almost compelled to confine their agricultural industry far too closely to the cultivation of their great staple of tobacco, with the unfortunate economic results which usually attend the prolonged and exclusive cultivation of one crop. The soil of these counties is usually good, their climate mild and healthy, and in most parts their scenery varied and attractive, and as they are specially adapted to trucking and small farming, they would readily support a dense population; but principally because of the lack of adequate means of transportation, and possibly though to a less extent to the disturbance of their previously existing social and industrial system by the war and the emancipation of the negroes, as well as perhaps by some tardiness and lack of elasticity in adapting themselves to the changed order of things, they have lagged behind the rest of the State, as the following table will show:

ST. MARY'S, CHARLES AND CALVERT COUNTIES.

| Date of Census. | Population. | Increase During Decade. | Decrease During Decade. | Percentage of Increase During Decade. | Percentage of Decrease During Decade. | Increase since 1790. | Decrease since 1790. | Percentage of Increase Since 1790. | Percentage of Decrease Since 1790. |
|---|---|---|---|---|---|---|---|---|---|
| 1790 | 44,809 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| 1800 | 41,168 | ........ | 3,641 | ........ | 8.13 | ........ | 3,641 | ........ | 8.13 |
| 1810 | 41,044 | ........ | [illegible] | ........ | .30 | ........ | 3,765 | ........ | 8.40 |
| 1820 | 37,547 | ........ | 3,497 | ........ | 8.52 | ........ | 7,262 | ........ | 16.21 |
| 1830 | 40,128 | 2,581 | ........ | 6.87 | ........ | ........ | 4,681 | ........ | 10.45 |
| 1840 | 38,476 | ........ | 1,652 | ........ | 4.12 | ........ | 6,333 | ........ | 14.13 |
| 1850 | 39,506 | 1,030 | ........ | 2.68 | ........ | ........ | 5,303 | ........ | 11.83 |
| 1860 | 42,177 | 2,671 | ........ | 6.76 | ........ | ........ | 2,632 | ........ | 5.87 |
| 1870 | 40,547 | ........ | 1,630 | ........ | 3.86 | ........ | 4,262 | ........ | 9.51 |
| 1880 | 46,020 | 5,473 | ........ | 13.50 | ........ | 1,211 | ........ | 2.70 | ........ |
| 1890 | 40,870 | ........ | 5,150 | ........ | 11.19 | ........ | 3,939 | ........ | 8.79 |

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Unfortunately for the permanence of their early prosperity, both along the Potomac to the south and west, and the Chesapeake to the east of them, navigable water extended far past them, and towns and cities naturally sprang up at the heads of navigation, at which places, of course, the land haul from the interior to the seaboard was the shortest. The great wagon routes, and subsequently the railroad lines from the West to the Atlantic ports, and from the North to the South along the coast, ran to and between the great shipping ports and centres of population; and these counties lying as they do off both the direct lines of travel from the West to Baltimore and Washington, and the roads running southwest along the coast from Boston, New York and Philadelphia have long suffered from their isolation and lack of facilities for transportation. Under such circumstances they have been almost compelled to confine their agricultural industry far too closely to the cultivation of their great staple of tobacco, with the unfortunate economic results which usually attend the prolonged and exclusive cultivation of one crop. The soil of these counties is usually good, their climate mild and healthy, and in most parts their scenery varied and attractive, and as they are specially adapted to trucking and small farming, they would readily support a dense population; but principally because of the lack of adequate means of transportation, and possibly though to a less extent to the disturbance of their previously existing social and industrial system by the war and the emancipation of the negroes, as well as perhaps by some tardiness and lack of elasticity in adapting themselves to the changed order of things, they have lagged behind the rest of the State, as the following table will show:

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|---|---|---|---|---|---|---|---|---|---|
| 1790 | 44,809 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| 1800 | 41,168 | ...... | 3,641 | ...... | 8.13 | ...... | 3,641 | ...... | 8.13 |
| 1810 | 41,044 | ...... | 124 | ...... | .30 | ...... | 3,765 | ...... | 8.40 |
| 1820 | 37,547 | ...... | 3,497 | ...... | 8.52 | ...... | 7,262 | ...... | 16.21 |
| 1830 | 40,128 | 2,581 | ...... | 6.87 | ...... | ...... | 4,681 | ...... | 10.45 |
| 1840 | 38,476 | ...... | 1,652 | ...... | 4.12 | ...... | 6,333 | ...... | 14.13 |
| 1850 | 39,506 | 1,030 | ...... | 2.68 | ...... | ...... | 5,303 | ...... | 11.83 |
| 1860 | 42,177 | 2,671 | ...... | 6.76 | ...... | ...... | 2,632 | ...... | 5.87 |
| 1870 | 40,547 | ...... | 1,630 | ...... | 3.86 | ...... | 4,262 | ...... | 9.51 |
| 1880 | 46,020 | 5,473 | ...... | 13.50 | ...... | 1,211 | ...... | 2.70 | ...... |
| 1890 | 40,870 | ...... | 5,150 | ...... | 11.19 | ...... | 3,939 | ...... | 8.79 |

The population of these counties was returned by the first census at a higher figure than by any other of the succeeding ten, except that of 1880. It is possible that even that exception may be more apparent than real, the seeming increase being not improbably due entirely to the more efficient machinery of enumeration then first put into operation. They seem to have had fewer inhabitants about 1820 than at any period since. Whether the closing of their accustomed transportation routes for some years during the preceding decade by the British fleet was the cause of this falling off in population, it is not now easy to say.

The progress of this section has been long retarded, but with the completion of the projected railroad lines from Baltimore and Washington through these counties, there are many reasons to believe that the conditions which have so long arrested their forward movement will be, in large measure, at least, removed. Whenever a change takes place it is likely to be accompanied by the springing up of towns and villages, of which this section of Maryland is now singularly destitute. Leonardtown, named after Leonard Calvert, the brother of the second Lord Baltimore and first Governor of the Province, and the county seat of St. Mary's county, is the most populous town in these counties, and in 1890 it had but 521 inhabitants.

### DENSITY OF SETTLEMENT.

At present the most densely settled portions of the State and the sections in which smaller cities, towns and villages are the most numerous, are the counties lying along the Pennsylvania border to the north and west of Baltimore City, except Garrett county, in the extreme west, which, situated as it is, among the higher ridges of the Alleganies, is still the most sparsely settled county in the State. Anne Arundel county directly bordering on Baltimore city, and containing, as it does, the city of Annapolis, has a high average density of settlement, although the more southern portions of the county are still comparatively thinly peopled.

The following table shows the number of inhabitants to each square mile of the land surface of each county in 1890:

| County. | Inhabitants to each square mile of land surface. | County. | Inhabitants to each square mile of land surface | County. | Inhabitants to each square mile of land surface. |
|---|---|---|---|---|---|
| Garrett | 20 | Anne Arundel | 85 | Cecil | 68 |
| Alleghany | 87 | Howard | 65 | Kent | 55 |
| Washington | 91 | Montgomery | 53 | Queen Anne's | 52 |
| Frederick | 77 | Prince George's | 54 | Caroline | 44 |
| Carroll | 76 | Calvert | 45 | Talbot | 69 |
| Baltimore | 117 | St. Mary's | 43 | Dorchester | 40 |
| Harford | 68 | Charles | 33 | Somerset | 66 |
| | | | | Wicomico | 54 |
| | | | | Worcester | 41 |
| Average for Northern Maryland | 75 | Average for Southern Maryland | 54 | Average for Eastern Shore | 58 |

### CITIES AND TOWNS.

Besides Baltimore the cities of Cumberland, Hagerstown, Frederick and Annapolis, each contained more than five thousand inhabitants in 1890. Of these cities Annapolis is the oldest, and Hagerstown during the last decade grew most rapidly.

The population of each of these cities, according to the ninth, tenth and eleventh censuses, was as follows:

| | 1890. | 1880. | 1870. |
|---|---|---|---|
| Cumberland | 12,729 | 10,693 | 8,056 |
| Frederick | 8,193 | 8,659 | 8,526 |
| Hagerstown | 10,118 | 6,627 | 5,779 |
| Annapolis | 7,604 | 6,642 | 5,774 |

In 1890 there were twenty-nine other places in Maryland with more than one thousand inhabitants each. The names of these towns, the population of each, and the county in which each is situated, are stated below:

| City or Town. | County. | Population. 1890. | City or Town. | County. | Population. 1890. |
|---|---|---|---|---|---|
| Cambridge | Dorchester | 4,192 | Crisfield | Somerset | 1,565 |
| Frostburg | Allegbany | 3,804 | Westernport | Allegbany | 1,526 |
| Havre de Grace | Harford | 3,244 | Ellicott City | Balto. and Howard. | 1,488 |
| Easton | Talbot | 2,939 | Towson | Baltimore | 1,487 |
| Salisbury | Wicomico | 2,905 | Snow Hill | Worcester | 1,488 |
| Westminster | Carroll | 2,903 | Belair | Harford | 1,416 |
| Chestertown | Kent | 2,633 | St. Michael's | Talbot | 1,329 |
| Sparrow's Point | Baltimore | 2,507 | Centreville | Queen Anne's | 1,309 |
| Elkton | Cecil | 2,318 | Williamsport | Washington | 1,277 |
| Catonsville | Baltimore | 2,115 | Northeast | Cecil | 1,249 |
| Laurel | Prince George's | 1,984 | Sharpsburg | Washington | 1,163 |
| Port Deposit | Cecil | 1,908 | Chesapeake City | Cecil | 1,155 |
| Pocomoke City | Worcester | 1,866 | Oxford | Talbot | 1,135 |
| Rockville | Montgomery | 1,568 | Oakland | Garrett | 1,086 |

### THE WHITE AND NEGRO POPULATION.

As in most of the other old slave States, the primary division of the people has always been between the pure Caucasians on the one side and persons with African blood in their veins on the other. In most of the earlier guesses at the population of the State, no attempt was made to estimate the ratio borne by the white to the colored population.

Since 1748, however, the number of inhabitants belonging to each class has always been estimated even if previous to the first Federal census in 1790 no actual count was made.

Repeating the caution that no great reliance can be placed upon the estimates of population made prior to 1790, the number of whites and of blacks in the Province or State at the date of each estimate, and of each Federal census, with the percentage the inhabitants of each

### DESCENT OF WHITE INHABITANTS.

The earlier settlers in the Province were, as a rule, of English birth. In the region bounding on Pennsylvania, from Baltimore westward, there was a numerous influx of Germans in the eighteenth century, and in particular neighborhoods the dialect commonly called "Pennsylvania Dutch" was sometimes spoken. In the later provincial period the Scotch Irish formed a very influential element of the population, while there were many pure Irish of the elder faith. Local antiquarians interested in particular European nations have traced out the part persons of those nationalities have had in the making up of Maryland, but however picturesque some of those settlers and their settlements may have been, it remains true that for practical purposes the entire white population of Maryland at the date of the Revolution, and for many years afterwards consisted of natives of the British Isles or of Germany and their descendants. Between the Declaration of Independence and 1830 there was no great immigration from abroad, although the troubles in San Domingo at the close of the eighteenth century first brought many refugees to the State, while the population of the rapidly-growing city of Baltimore was being materially increased by newcomers from abroad. The movement from Europe beginning somewhat earlier than the date of the great Irish famine and of the political troubles in Europe, following the popular risings of 1848, was given an enormous impetus by these events.

The nativities of the population were first returned in 1850, and the following table shows the number of the native and foreign inhabitants of the State at each census from that time to this, and the ratio which each bears to the total population:

| Date of Census. | Population | | Percentage of Total Population. | |
|---|---|---|---|---|
| | Native. | Foreign. | Native. | Foreign. |
| 1850 | 531,825 | 51,209 | 91.22 | 8.78 |
| 1860 | 609,513 | 77,536 | 88.72 | 11.28 |
| 1870 | 697,482 | 83,412 | 89.32 | 10.68 |
| 1880 | 852,137 | 82,806 | 91.14 | 8.86 |
| 1890 | 948,094 | 94,296 | 90.95 | 9.05 |

As the preceding table shows, there has been no great change in the last fifty years in the relative number of the native and foreign born inhabitants of the State. The latter were, however, proportionately somewhat more numerous in 1860 than they have been at any time since.

On the other hand, natives of the United States, one or both of whose parents were born abroad, formed in 1890 relatively a somewhat larger element of the population than at any time since 1870, when for the first time a return of the parentage of the inhabitants was made, as the following table shows:

| Date of Census. | Aggregate Population. | Native of Foreign Parentage. | |
|---|---|---|---|
| | | Number. | Percentage. |
| 1870 | 780,894 | 97,950 | 12.54 |
| 1880 | 934,943 | 136,028 | 14.55 |
| 1890 | 1,042,390 | 156,421 | 15.00 |

The population of foreign parentage, whether of native or foreign birth, is very unevenly distributed over the State. Proportionately it is most numerous in Alleghany county, where it constitutes no less than 45.05 per cent. of the aggregate number of inhabitants. The bringing in during the last forty or fifty years of successive importations of foreign miners and laborers to work the mines in this county, has resulted in the foreign element being there more largely represented than elsewhere. Next to Alleghany county, it is in Baltimore city that foreigners and the children of foreigners are relatively the most abundant, forming as they do 41.55 per cent. of the total population of the metropolis of the State. Such counties as Baltimore, Anne Arundel, Harford and Howard, adjoining on or lying in the immediate neighborhood of Baltimore city and Garrett, to which some of the foreign born residents of the neighboring county of Alleghany and some of their children have moved, come next in order. Outside of the city and counties above named, there are no counties in the State in which persons of foreign parentage amount to as much as 10 per cent. of the total population, while in some of the more Southern counties of the Eastern and Western Shores not one inhabitant in every hundred had either parent born abroad.

In Maryland, as generally throughout the country, immigrants from Europe seem consciously or unconsciously to avoid sections in which persons of negro blood are numerous. The following table, which shows the relative proportion of native whites, of native whites of foreign parentage, of foreign born whites, of native colored and of

foreign born colored for each county in the State, makes this tendency quite plain:

| Counties. | Aggregate Population. | Native White of Native Parentage. | | Native White of Foreign Parentage. | | Foreign White. | | Native Colored. | | Foreign Colored. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number. | Per Cent. | Number. | Per Cent. | Number. | Per Cent. | Number. | Per Cent. | Number. | Per Cent. |
| Allegany | 41,571 | 21,405 | 51.49 | 13,109 | 31.53 | 5,621 | 13.52 | 1,430 | 3.44 | 6 | .02 |
| Anne Arundel | 34,094 | 14,657 | 42.99 | 2,015 | 5.91 | 2,906 | 8.53 | 14,497 | 42.52 | 17 | .05 |
| Baltimore | 72,909 | 41,044 | 56.30 | 13,304 | 18.11 | 8,431 | 11.56 | 10,206 | 14.00 | 22 | .03 |
| Baltimore City | 434,439 | 186,625 | 42.96 | 111,942 | 25.77 | 68,576 | 15.78 | 66,960 | 15.39 | 427 | .10 |
| Calvert | 9,860 | 4,731 | 47.98 | 32 | .32 | 33 | .34 | 5,064 | 51.36 | ..... | ..... |
| Caroline | 13,903 | 9,570 | 68.83 | 283 | 2.04 | 239 | 1.72 | 3,809 | 27.40 | 2 | .02 |
| Carroll | 32,376 | 28,080 | 86.57 | 1,528 | 4.72 | 683 | 2.11 | 2,133 | 6.59 | 2 | .01 |
| Cecil | 25,851 | 19,421 | 75.12 | 1,535 | 5.94 | 894 | 3.46 | 4,001 | 15.48 | ..... | ..... |
| Charles | 15,191 | 6,772 | 44.58 | 170 | 1.12 | 112 | .73 | 8,136 | 53.56 | 1 | .01 |
| Dorchester | 24,843 | 15,797 | 63.59 | 188 | .76 | 148 | .59 | 8,707 | 35.05 | 3 | .01 |
| Frederick | 49,512 | 40,041 | 80.87 | 1,896 | 3.83 | 1,046 | 2.11 | 6,526 | 13.18 | 3 | .01 |
| Garrett | 14,213 | 11,813 | 83.12 | 1,635 | 11.50 | 580 | 4.08 | 185 | 1.30 | ..... | ..... |
| Harford | 28,993 | 18,906 | 65.20 | 2,453 | 8.46 | 1,259 | 4.35 | 6,374 | 21.98 | 2 | .01 |
| Howard | 16,269 | 9,730 | 59.81 | 1,623 | 9.98 | 806 | 4.95 | 4,107 | 25.24 | 3 | .02 |
| Kent | 17,471 | 9,985 | 57.15 | 432 | 2.47 | 247 | 1.41 | 6,804 | 38.95 | 3 | .02 |
| Montgomery | 27,185 | 16,462 | 60.56 | 686 | 2.52 | 352 | 1.29 | 9,685 | 35.63 | ..... | ..... |
| Prince George's | 26,080 | 13,364 | 51.24 | 915 | 3.51 | 586 | 2.25 | 11,213 | 42.99 | 2 | .01 |
| Queen Anne's | 18,461 | 11,440 | 61.97 | 302 | 1.63 | 162 | .88 | 6,555 | 35.51 | 2 | .01 |
| St. Mary's | 15,819 | 7,986 | 50.36 | 121 | .76 | 66 | .42 | 7,686 | 48.46 | ..... | ..... |
| Somerset | 24,155 | 14,464 | 59.88 | 118 | .49 | 68 | .28 | 9,500 | 39.33 | 5 | .02 |
| Talbot | 19,736 | 11,374 | 57.63 | 496 | 2.51 | 375 | 1.91 | 7,486 | 38.44 | 2 | .01 |
| Washington | 39,782 | 35,197 | 88.48 | 1,579 | 3.96 | 507 | 1.27 | 2,506 | 6.30 | 2 | ..... |
| Wicomico | 19,930 | 14,565 | 73.18 | 104 | .52 | 42 | .21 | 5,196 | 26.08 | 1 | .01 |
| Worcester | 19,747 | 12,907 | 65.36 | 64 | .32 | 41 | .21 | 6,731 | 34.09 | 4 | .02 |
| The State | 1,042,390 | 576,365 | 55.29 | 156,421 | 15.00 | 93,787 | 9.00 | 215,388 | 20.67 | 309 | .04 |

The proportion which the natives born of foreign parentage bear to the foreign born, varies considerably. In some counties, such as Allegany, to which immigration was relatively greater a generation ago than it is now, the foreigners are less than half as numerous as the natives of foreign parentage. In other counties to which foreign immigration has but recently set in, the foreigners are more numerous than the native children of foreigners.

Large as has been the foreign element added to the population of Maryland within the last sixty years, there is no reason to doubt that the overwhelming majority of it will be absorbed without difficulty in the native population, as much of it has already been, and that too, without making any noticeable change of importance in the previously existing character of the population. Immigrants from Europe have brought various customs with them. Such of these customs as proved attractive to Americans and were adopted to a greater or less extent by them, have taken some root, and are likely to continue, while the rest seldom last much longer than the generation which brought them over the ocean. Persons who fear a permanent change in the character of the population lose sight of the fact that the branches which have been engrafted upon the older American stock are very closely related to it.

The English race was composed of an admixture in varying proportions of the victorious invading hosts of the Germanic and Scandinavian tribes with the original Celtic inhabitants of the British Isles. As the following table shows, the overwhelming majority of the foreigners residing in Maryland are, and always have been, natives either of the British Islands, or of some of the Scandinavian or Germanic countries of continental Europe:

| | Total Foreign Population. | Born in British Isles or in Germanic or Scandinavian Countries. | | All Others. | |
|---|---|---|---|---|---|
| | | Number. | Per Cent. | Number. | Per Cent. |
| 1850 | *53,288 | 51,798 | 97.20 | 1,490 | 2.80 |
| 1860 | 77,529 | 75,980 | 98.00 | 1,549 | 2.00 |
| 1870 | 83,412 | 79,098 | 94.83 | 4,314 | 5.17 |
| 1880 | 82,806 | 77,728 | 93.87 | 5,078 | 6.13 |
| 1890 | 94,296 | 82,321 | 87.30 | 11,975 | 12.70 |

*The total foreign population for 1850 stated in this table differs from that given in a previous table. The difference exists between the different tables in the Census of 1850.

It will be noticed, from the above table, that there has recently been a marked relative increase in the immigration to Maryland of members of non-British and non-Teutonic races. The following table shows that this increase has been principally among natives of Bohemia, Italy, Poland and Russia, the number of persons born in those countries and residing in Maryland having risen from 2,501 in 1880 to 9,025 in 1890:

| | 1850. | 1860. | 1870. | 1880. | 1890. |
|---|---|---|---|---|---|
| Austria "Proper" | 16 | 122 | 266 | 401 | 1,388 |
| Bohemia | ........... | ........... | 789 | 1,169 | 1,554 |
| British America | 215 | 333 | 644 | 988 | 1,020 |
| France | 507 | 599 | 649 | 620 | 623 |
| Germany | 27,124 | 43,762 | 47,045 | 45,481 | 52,436 |
| England | 3,467 | 4,235 | 4,932 | 5,244 | 5,591 |
| Ireland | 19,557 | 24,872 | 23,630 | 21,865 | 18,735 |
| Scotland | 1,093 | 1,583 | 2,432 | 2,645 | 2,323 |
| Wales | 260 | 701 | 994 | 924 | 761 |
| Italy | 82 | 229 | 210 | 477 | 1,416 |
| Poland | ........... | 66 | 145 | 642 | 1,797 |
| Russia | 23 | 15 | 50 | 213 | 4,258 |
| All Other Countries | 944 | 1,019 | 1,626 | 2,137 | 2,393 |
| Total | 53,288 | 77,536 | 82,806 | 82,806 | 94,296 |

# CHAPTER XVI.

## CHARITIES AND CORRECTION.

The preceding pages have described many institutions that are deemed worthy of praise, but in few of them does Maryland take more pride than in her charities. The cry of the needy has always brought a generous response, and many earnest lives and many fortunes have been devoted to the care of the dependent and delinquent.

### ADVANCED METHODS.

Since the administration of charity has become a subject of scientific study, and public attention has been given to the methods and ultimate effects rather than to the amount of charity, Maryland has been comparatively quick to adopt the improved methods. How to relieve distress without pauperizing the recipients, how to restore the wayward to lives of usefulness, and how to give the homeless child a just share in our inherited civilization, are questions to whose solution a goodly number of the people of Maryland are devoting their best energies.

As early as 1849 the Society for the Improvement of the Condition of the Poor was organized, having for "its object and design" "to discourage indiscriminate alms-giving, street begging, pauperism and idleness; and to elevate the moral and physical condition of the indigent, and so far as compatible with those objects, the relief of their necessities." Thus a beginning was made in the reformation of charities, though the fact that the association soon became almost exclusively a relief-giving agency, indicates that public sentiment did not yet recognize the importance of curing as well as feeding the pauper.

The association, however, has never forgotten its avowed purpose, and much has been accomplished by it toward the introduction of wise methods of relief.

In 1868, the Maryland Prisoners' Aid Association was established with reform in punitive methods as one of its leading objects.

Through the efforts of this association and its honored president, countless abuses have been remedied, a number of reformatory institutions have been established, and public attention has been constantly directed to the importance of preventive and reformatory measures.

Toward improvements in the structure and management of county almshouses and jails several influences have conspired. Since 1870 an officer of the Prisoner's Aid Association has annually visited these institutions, giving valuable suggestions to those in charge, and calling public attention to abuses which require the force of public opinion for their redress.

An important factor in this reform movement was a plain-spoken report upon the public charities of Maryland, which was issued by the State Board of Health in 1877; and since 1885 the frequent visits and annual reports of the State Lunacy Commission have stimulated the progressive tendencies. As a result of these efforts the secretary of the commission confidently affirms that the Maryland almshouses and jails are, on the whole, as well conducted as those of any State in the Union.

The improvements in the management of almshouses and jails, resulting somewhat incidentally from the activity of the State Board of Health and the Lunacy Commission, indicate that still more might be accomplished by a Board charged especially with the oversight of the charities of the State; and the establishment of a State Board of Charities is now under consideration.

But since its establishment in 1881, the Charity Organization Society of Baltimore has been the chief factor in the dissemination of advanced methods in the administration of charities. Of the specific work of these societies more will be said in another place.

The institutions for the care of the dependent and delinquent classes of Maryland naturally centre in Baltimore, where the aggregation of nearly one-half the population of the State concentrates social needs and renders organized effort for their relief both natural and easy. The present chapter, therefore, will first consider those institutions and societies which are dealing with the social problems of Baltimore, and then, under each subdivision, something will be said of the local work which is being done in the various branches of charity and correction in the different counties of the State. In describing these institutions an effort will be made to follow a natural order.

### INSTITUTIONS FOR INFANTS.

Through this order of treatment the first picture to present itself is one of the saddest of all. Over four hundred friendless little infants, deprived of mothers through death, or more often, cast away by them in order to escape burdens or hide shame, are yearly brought to the three infant asylums.

Most of the abandoned infants which are brought in by the Police Department soon die from the effects of bad blood, disease and exposure.

The population of these counties was returned by the first census at a higher figure than by any other of the succeeding ten, except that of 1880. It is possible that even that exception may be more apparent than real, the seeming increase being not improbably due entirely to the more efficient machinery of enumeration then first put into operation. They seem to have had fewer inhabitants about 1820 than at any period since. Whether the closing of their accustomed transportation routes for some years during the preceding decade by the British fleet was the cause of this falling off in population, it is not now easy to say.

The progress of this section has been long retarded, but with the completion of the projected railroad lines from Baltimore and Washington through these counties, there are many reasons to believe that the conditions which have so long arrested their forward movement will be, in large measure, at least, removed. Whenever a change takes place it is likely to be accompanied by the springing up of towns and villages, of which this section of Maryland is now singularly destitute. Leonardtown, named after Leonard Calvert, the brother of the second Lord Baltimore and first Governor of the Province, and the county seat of St. Mary's county, is the most populous town in these counties, and in 1890 it had but 521 inhabitants.

### DENSITY OF SETTLEMENT.

At present the most densely settled portions of the State and the sections in which smaller cities, towns and villages are the most numerous, are the counties lying along the Pennsylvania border to the north and west of Baltimore City, except Garrett county, in the extreme west, which, situated as it is, among the higher ridges of the Alleganies, is still the most sparsely settled county in the State. Anne Arundel county directly bordering on Baltimore city, and containing, as it does, the city of Annapolis, has a high average density of settlement, although the more southern portions of the county are still comparatively thinly peopled.

The following table shows the number of inhabitants to each square mile of the land surface of each county in 1890:

| County. | Inhabitants to each square mile of land surface. |
|---|---|
| Garrett | 20 |
| Alleghany | 87 |
| Washington | 91 |
| Frederick | 77 |
| Carroll | 76 |
| Baltimore | 117 |
| Harford | 66 |
| Average for Northern Maryland | 75 |

| County. | Inhabitants to each square mile of land surface. |
|---|---|
| Anne Arundel | 85 |
| Howard | 65 |
| Montgomery | 53 |
| Prince George's | 54 |
| Calvert | 45 |
| St. Mary's | 43 |
| Charles | 33 |
| Average for Southern Maryland | 54 |

| County. | Inhabitants to each square mile of land surface. |
|---|---|
| Cecil | 68 |
| Kent | 55 |
| Queen Anne's | 52 |
| Caroline | 44 |
| Talbot | 69 |
| Dorchester | 40 |
| Somerset | 66 |
| Wicomico | 54 |
| Worcester | 41 |
| Average for Eastern Shore | 58 |

As the name of the institution implies, it embraces a hospital department for the benefit of sick children. A new wing has recently been built which makes room for about fifty more children upon the upper floor, while the lower floor is equipped as a dispensary for the treatment of such children of the poor as do not require residence in the hospital.

The third infant asylum of Baltimore is known as *St. Elizabeth's Home for Colored Orphan Children.* It is under the management of the Sisters of the Franciscan Order. The department for infants is located at No. 317 St. Paul street, where about one hundred colored foundlings and orphans were received last year. The number is increasing. As soon as old enough to receive instruction the boys are transferred to the Wilmington orphanage for colored boys, but the girls remain with the Franciscan Sisters in a neatly kept orphanage connected with the Franciscan Convent, on Maryland avenue. One-half the working-hours are devoted to study and one-half to learning house-work and sewing. The girls are placed out at service in families as soon as they have had sufficient training.

*The Home for Mothers and Infants,* on Barclay and Twenty-first streets, is doing good work in saving both mother and infant by keeping them together. A recent report of this home says: "There is no better education for the mother's character than the care of her child. When the mother first comes to us she may be an ignorant, childish, frivolous young girl, her higher nature dormant, her reason and conscience in so undeveloped a state that they cannot be relied on as a guiding power. But there is one resource. What the undeveloped conscience cannot do for her, her love for her child will accomplish."

Since the institution was opened in 1890, about fifty destitute mothers with their infants have found in it a temporary home, and a sanitarium for their moral, physical and economic improvement. The women usually remain in the home from eight to ten months, during which time they are kept busy, so far as their strength permits, in learning to sew, do housework, and care for their infants properly, and in making clothing. An opportunity is given for earning something by their work, and when they are prepared to leave, positions are found for them, usually in the country, where they can support themselves with their infants.

### DAY NURSERIES.

Two day nurseries have been established in East Baltimore for the care of the small children of industrious women who are kept from their homes all day by employment. The mothers are charged five cents a day for one child, seven cents for two and ten cents for three. *The Baltimore Day Nursery* is on Patterson Park avenue, and the *North-*

*eastern Day Nursery* is on Orleans street. A day nursery has also been established in connection with the Electric Sewing Machine Rooms.

### FREE KINDERGARTENS.

The Kindergarten seems likely to become a part of the public school system, but at present the free kindergartens of Baltimore are supported and managed as private charities. The importance of the kindergarten as a means for rescuing little children from harmful influences and directing their pliant minds into channels that lead to intellectual activity and moral strength, is being recognized more and more each year.

The first free kindergarten in Baltimore was opened in 1883, under the supervision of the Woman's Christian Temperance Union. Since then, according to a recent report made to the Kindergarten Association, the number has been increased to ten for children from the streets and alleys, and four for children in institutions.

They are supported largely by individual churches, and are usually located in those portions of the city which contain the greatest number of poor children. The increasing interest in this means of bettering the condition of the children of the poor has been manifested during the past winter in the formation of a Kindergarten Association for the purpose of establishing new free kindergartens, and furthering the adoption of the kindergarten system in the public schools.

### PROTECTION OF CHILDREN.

Before describing the Homes for Children some mention should be made of the means of rescuing the unfortunate ones from the cruelty of unnatural parents, and from an environment of vice and crime.

For this purpose the *Society for the Protection of Children from Cruelty and Immorality* was organized in June of 1877. A salaried agent devotes his entire time to the work of the society in protecting children within their homes, removing them when necessary, and seeing that the laws in behalf of children are carried out.

During the year ending March 31, 1893, 208 cases were investigated, affecting the welfare of 471 children, and 189 children were removed from cruel, intemperate or depraved parents or guardians. Of this number 28 were found homes in private families, 15 were transferred to the Henry Watson Children's Aid Society and 146 were placed in twenty-one different homes or reformatories for children.

An important part of the work of this society has been directed toward the enactment of suitable *Laws for the Protection of Children.* In respect to the legislative work we will quote from a sketch of the

Society for the Protection of Children, which Mr. G. S. Griffith addressed to the National Prison Congress of December, 1892:

It is generally conceded by persons familiar with such matters, that the State of Maryland occupies the most advanced position in the matter of this kind of legislation, and this is owing entirely to the efforts of the Society. The various statutory regulations, drafted and presented at different times to the Legislature by the Society, and afterwards enacted, will be briefly noted.

1. The *habeas corpus* law. The effect of this statute is to enable judges in all cases involving the custody of children to proceed with *sole regard* to the interest of the child and to do everything that a humane regard for the child's welfare requires, absolutely ignoring every other consideration. The entire subject is placed upon a strictly humanitarian basis.

2. The destitute and suffering minors' law. Under this act a child that is neglected or ill-treated can be immediately removed from its parent or other custodian, without any of those delays or formalities that are incident to ordinary legal proceedings.

3. A statute, exceedingly comprehensive in its terms, prohibiting the use of children for begging or the like.

4. A statute, exempting from vexations, suits or prosecutions, persons who "harbor" children, when there is reason to believe that they have been ill-treated by their parents.

5. A statute, prohibiting the selling or giving of cigars, cigarettes or tobacco to minors under fifteen years.

6. A statute, recently passed and very stringent, prohibiting the employment of children under sixteen years for more than ten hours a day.

7. A recent statute, authorizing courts to sentence minors to juvenile institutions instead of ordinary prisons.

8. An "adoption" law passed by the Legislature of 1892.

### HOMES FOR CHILDREN.

It seems natural that the care of orphans should be the first charity to be undertaken by the public in a systematic way, and whatever other institutions may have been in existence during the early history of the city it is at least true that the oldest of the present charitable institutions of Baltimore are orphanages.

The Benevolent Society of St. Paul's Parish was incorporated in 1799 for the support of an orphanage which is still sustained with increasing resources.

The Baltimore Orphan Asylum grew out of a "charity school," which was incorporated as early as 1778, and assumed the name of "Female Orphaline Charity School" in 1801.

A number of the other orphanages started as free schools for the education of indigent children, but when the free public schools made that charity unnecessary, the funds which had accumulated for the support of the schools were used for the care of orphans. The name St. Peter's School is still to be seen over the door of the orphanage on Myrtle avenue, and the corporation known as the Trustees of St. Peter's School is still in active existence as a support for the orphanage.

Including the infant asylums already described, and excluding correctional institutions, there are forty-one homes for children in Maryland.

With the exception of a State institution for feeble-minded children and a State school for the deaf, all these homes are under private control, though fifteen receive appropriations from the State treasury and twelve from Baltimore city.

The following figures are obtained from data carefully gathered for the Maryland exhibit in the department of charities and correction at the World's Columbian Exposition:

Excluding the special schools and the industrial homes, we find thirty-three homes, which shelter 1,743* children. The real estate so occupied, exclusive of buildings rented, was valued at $1,781,665, and in addition to the use of this property the operating expenses of these institutions the last fiscal year amounted to $182,649. These expenses were met in part by the income from endowments and productive investments amounting in the aggregate to about $2,505,583. A total indebtedness of $29,344 was reported; but the interest upon the indebtedness was not included in the operating expenses. Thus we find that upon the average, the support of an orphan for one year costs $104.79 in addition to the use of $1,022.18 of property.†

Of the small children, more boys are received than girls, and fewer are adopted; but the boys leave the institution earlier than the girls. In accordance with the public sentiment upon that point, white and colored children are never found in the same institution, though both races are well provided for.

The orphanages of Baltimore are subject to no general control nor systematic visitation, and of course the efficiency of their work varies with the special fitness of those who are placed in charge; but public interest in their work acts as a stimulus to good management, and, granting that orphans must be raised in institutions, it may be doubted whether much better results could be obtained without greater outlay. There are a few which may be called ideal homes; in none do we find gross abuses. That they are well managed from the standpoint of sanitation is indicated by the low death rate which, excluding infant asylums, was for the last year but seven to the thousand.‡

On looking at these institutions more closely, they appear to fall into groups. In the first place there are three large non-denominational orphanages, with from one hundred and twelve to one hundred and fifty

* [illegible]

† [illegible]

‡ [illegible]

boys and girls in each, then a group of five orphan asylums under Roman Catholic management, then three Protestant institutions for colored children, a Hebrew orphan asylum, eight denominational or church orphanages, mostly for girls; then a group of institutions, mostly for older children, which are more distinctly industrial or educational; and, finally, five local orphanages in different parts of the State.

All these institutions, except one home for little colored children, provide at least an elementary education in English branches, usually about the same that is given to children of the same age in the public schools, though as a rule institution children are not as readily interested in studies as those who are stimulated by the outside life. In addition to their school studies, girls are always taught to sew and do housework.

The *Home of the Friendless*, on Druid Hill Avenue, is the largest Protestant orphanage in the State. Destitute children of all ages under twelve years are received, though but few are taken in infancy. Many children are placed here temporarily by parents who hope soon to be able to provide for them again. When able, such parents pay something for the support of their children.

A kindergarten has been recently established for the younger children. Suitable homes are found for the inmates as soon as possible, and but few are kept beyond the age of twelve. Of the 266 children in the institution last year there were:

| | |
|---|---|
| Discharged to Parents or Friends | 75 |
| Provided with Homes | 33 |
| Transferred to McDonogh School | 4 |
| Transferred to Manual Labor School | 2 |
| Transferred to Samuel Ready Home | 3 |
| Transferred to All Saints' Orphanage | 2 |
| Died | 3 |
| Remaining at the close of the year | 155 |

The *Baltimore Orphan Asylum*, on Stricker street, receives only children who are above five years of age, and usually retains them till they are able to earn their living in the outside world. Like the Home of the Friendless, this asylum is supported in part by private subscriptions and public appropriations, but its chief income is derived from investments which have been accumulating ever since Captain Yellott bequeathed $2,000 to it in the year 1807.

The third of the large general orphan asylums is known among its patrons as the *Allgemeines Deutsches Waisenhaus*. It is supported by the Protestant German population of the city, over twenty-eight hundred persons contributing each year in sums varying from twenty-five cents to fifty dollars. A sewing society of three hundred and sixty-six members supplies the clothing, and, according to the last printed report, fourteen other German societies are associated with the asylum.

At the age of fourteen the boys are bound out to learn a trade, and most of the girls are provided with homes or situations as domestics. One of the most interesting features of this institution is its use of the neighboring public schools for the education of the children. The expense of separate schools is thus avoided, and the children have the stimulus of contact with outer life. The superintendent of this institution reports that no extra difficulty arises from the system, and the Hebrew Orphan Asylum has adopted the same method with satisfaction.

Among the institutions which are under Roman Catholic management we find a correlation which is largely wanting in the other charities of the city. St. Vincent's Infant Asylum provides for white children under seven years of age, while between the ages of seven and fourteen girls find a home in *St. Mary's Female Orphan Asylum* and boys in the *St. Vincent de Paul Orphan Asylum,* where school work receives the chief attention. Older girls are given industrial training at St. Joseph's House of Industry, and a reformatory institution is provided for wayward children of each sex. The St. Mary's Orphan Asylum maintains more children than any other institution in the State. Many girls are committed to it from the different counties as well as from the city, and its support is largely derived from public appropriations. The city pays two dollars a week each for eighty or ninety committed children.

The St. Vincent de Paul Asylum, on Front street, is managed by the Brotherhood of the Christian Schools, and the boys attend the St. Vincent de Paul parish school.

*St. Anthony's German Orphan Asylum* is supported by the German Catholic churches of Baltimore. The children attend the St. James Parochial School, and at the age of twelve are placed in German Catholic families, where they are regularly visited.

There are two other Roman Catholic institutions for white children located on Gough street in East Baltimore: The *Dolan Children's Aid Asylum* and *St. Patrick's Orphan Asylum.* The children from both attend neighboring Catholic schools, and both are supported in part by an income from the estate left by Father Dolan.

For colored orphans there are two institutions under Catholic management: The St. Elizabeth Home, already described, and the *St. Frances Orphan Asylum,* on East Chase street. The latter institution is under the control of the Oblate Sisters of Providence, a Roman Catholic sisterhood of colored women, established in 1829 for the education of colored girls. Under the same roof is an academy for colored girls, and a few of the orphans who are especially bright in their studies receive advanced instructions in the academy. The support for the orphans is obtained largely by personal solicitation.

Of the three Protestant institutions for colored children the one of chief interest is the *Johns Hopkins Colored Orphan Asylum*, where about thirty girls are being trained for useful lives.

Among the directions given by Johns Hopkins to the Trustees of the Johns Hopkins Hospital Endowment, provision was made for the establishment, at some future time, of a large institution "for the reception, maintenance and education of orphan colored children." Accommodation was to be provided for three or four hundred children, and a possible income of twenty thousand dollars was named. The execution of the other provisions of the Hopkins gift have made it necessary to delay the establishment of the orphans' home, upon the large scale contemplated by the donor, and meanwhile the present asylum for colored girls is being maintained from the Hospital fund.

*St. Mary's Home for Colored Boys* is one of the charities connected with the Mount Calvary Protestant Episcopal Church, and is under the management of a branch of the Order of All Saints' Sisters.

The *Simmons Home for Friendless Children* is managed by an association of charitable colored people. It has been lately reorganized and moved to No. 130 North Pearl street.

One of the largest and best conducted of the homes for children is the *Hebrew Orphan Asylum*, on Calverton Heights. The large building, imposing from the outside, is scrupulously clean within, and order is everywhere apparent. A kindergarten is provided for the little children. The older ones attend the public school, where they are said to stand at the head of their classes. On returning from the public schools an hour is given to the study of Hebrew and German. An Orphans' Aid Society, composed of several hundred Hebrew women, supplies clothing for the children, and finds employment for them on leaving the orphanage. By the help of this society a "grand bazaar" was held in March of 1892, which yielded over twenty-three thousand dollars for the benefit of the orphan asylum and other Hebrew charities.

There is room for but few words concerning the eight church orphanages. Two only receive boys. *St. John's Orphanage*, at Waverley, is under the control of the vestry of St. John's Episcopal Church, and the boys attend the parish school. The *Baptist Orphanage of Maryland*, on West Lanvale street, receives both boys and girls. It was opened in October of 1890, through the efforts of two charitable women, who devote their time to the care and instruction of the children. The support comes largely from the Brantley Baptist Church.

Of the six church orphanages for girls, four are connected with Protestant Episcopal Churches: The *All Saints' Training Home* (Mount Calvary Church); the *Girls' Orphanage of St. Paul's Parish*, incorporated as The Benevolent Society of the City and County of Baltimore; the *Christ*

*Church Asylum for Female Children*, and *St. Peter's Asylum for Female Children*. The *Egenton Female Orphan Asylum* is under the control of the First Presbyterian Church, and the *Kelso Home for Orphans of the Methodist Episcopal Church* is under the partial control of the Baltimore Methodist Conference, though it has a self-perpetuating board of trustees. All of these orphanages, except the last, receive young girls of any denomination, and all keep them in charge until eighteen years of age. The comparatively small number in each institution allows some approach to family relationship, and an effort to make the orphanage pleasant and homelike is apparent in all. The Benevolent Society, Egenton, and Kelso homes are supported entirely by endowments, while the others depend largely upon annual subscriptions and contributions. The Christ Church and Kelso Homes occupy fine buildings in North Baltimore, and the Benevolent Society has a summer home in the same part of the city.

In the church orphanages for girls much attention is given to moral, intellectual and industrial training; but two of the endowed homes for children have been so carefully planned from the standpoint of education that they are no less interesting to the educator than to the philanthropist. One of these is the McDonogh School for Boys, which has been treated in another chapter; the other is the *Samuel Ready Asylum for Female Orphans*, which will now be described somewhat in detail as an institution especially worthy of study.

Upon the death of Samuel Ready in 1871 the sum of $371,000 was placed in the hands of a self-perpetuating board of trustees for the establishment and support of the asylum, which had already been incorporated. By allowing this fund to accumulate for a number of years, the grounds have been purchased and improved with a total cost of $179,000, while still leaving a productive endowment of $524,947. The income from this endowment is greater than the annual operating expenses, and the surplus is used for new buildings. A new wing was built last year, a house for the gardener has just been completed, and a school building separate from the home is planned by the trustees in order to increase the capacity of the institution. There are now sixty girls in the home, thirty-eight from Baltimore and twenty-two from twelve counties of the State. The number of eligible applicants so much exceeds the capacity of the house that, as with the McDonogh School, some discretion may be used in selecting those who will make the best use of the exceptional advantages which are offered. In the introduction to a recent report of the United States Bureau of Education upon "Industrial and Manual Training in Public Schools," Mr. Isaac Edwards Clarke speaks of the Samuel Ready Asylum as "an ideal orphans home," and describes some of its characteristics in the following words:

"The feature which differences this from many other similar 'orphans' homes' is the care taken to prevent any consciousness by the children that they are inmates of a charitable institution; while in many so-called orphans' homes, there seems to be a constant effort to impress this one fact upon the consciousness of the unfortunate child-inmates. In this truer 'home,' on the contrary, the development of the independence, self-reliance, self-respect, and personal character of the individual child, is a constant purpose kept in view; in connection with the effort to surround all with the protection and happiness of a home. The children of this family, inmates of a cheerful, well-ordered household, may well be reckoned as exceptionally fortunate. Here the spirit of Fröbel's ideals of child happiness and child development seems to be admirably embodied; though not shown by formal kindergarten methods." *

"The excellent methods here adopted are, indeed, well worth the careful study of all interested in similar establishments; yet, in this instance, as in so many others of exceptional success, the secret must be held to lie rather in the personality of the individual teacher, than in formal communicable methods."

An air of culture and refinement is to be found in all the appointments of the house. Curtains in the dormitories and bath-rooms provide private apartments for dressing and the daily bath. The usual orphans' uniform gives way to tasteful garments suited to the features and to the choice of each individual. Through an elaborate system of rotation all kinds of household duties are assigned and each room is placed in the charge of some girl who uses, and cultivates, her own taste in keeping it in order. Each child has a small flower-bed of her own. All are taught sewing, cooking and even marketing and shopping. An opportunity for earning money at the rate of two cents per hour is given for overtime work, and the girls learn to economize in the use of their earnings. Every care is taken to preserve the health of the pupils, and there has been no serious illness in the institution since it was opened in 1887.

The girls have a vacation in August, varying in length from one day to three weeks. Those who do the best work or make the greatest effort, get the longest holiday, and the fact that the length of their holiday depends upon themselves is a great incentive to earnest effort.

In the school-room the most approved methods are in use; drawing, vocal music, and physical culture are prominent features in the instruction of all. As all the girls must be prepared for self-support, each individual receives careful attention, and is given special instruction in accordance with her proclivities. Twelve girls are now learning type-

* There is a kindergarten class, though it is used chiefly as a recreation or as a reward for good class work. No children are received under five years of age.

writing, and ten instrumental music; two are taking drawing lessons at the Maryland Institute; one is receiving special instruction in scientific cooking, while five are taking a special course in dress making. The girls attend churches of their respective denominations, and no sectarian views are inculcated, but in all the regulations of the institution the development of strong moral character is recognized as the most important object to be attained.

*The Boys' School of St. Paul's Parish* is an institution for the maintenance and education of poor boys during the school year. Twenty-five are now in attendance. Some of the boys return to their homes during the summer, and some are supported elsewhere by the school.

*The Baltimore Manual Labor School for Indigent Boys* is at the same time an educational and an industrial institution, located a few miles from the city upon a farm of one hundred and fifty acres. According to the Baltimore Charities Directory, about thirteen hundred boys have been received since the foundation of the institution in 1845. The products of the farm, through the help of the boys, yield about one-half the operating expenses.

*St. Joseph's House of Industry*, like St. Vincent's Infant Asylum and St. Mary's Female Orphan Asylum, is under the management of the Sisters of Charity, and nearly all its seventy-five inmates came from the latter institution. Only girls between the ages of twelve and eighteen are received. An hour a day is devoted to school work, but the chief occupation is sewing. Each girl is given thorough instruction in the different branches of sewing and dressmaking, and much fine work is done for regular customers. When the girls leave the house employment and suitable homes are found for them; but they are welcomed back whenever in need or out of work. A country home near Jessup's is used as a summer resort.

Among the other educational homes should be mentioned the *Asylum and Training School for the Feeble Minded of the State of Maryland*. This is a State institution, opened in 1888, and located upon a large farm at Owings' Mills. Kindergarten methods are used for brightening the intellects of these unfortunate children, and those who are capable receive instruction in reading, writing, arithmetic and various industrial pursuits.

A much-needed institution for epileptics will probably be built upon the same farm in the near future.

The *Font Hill Private Institution for Feeble-Minded and Epileptic Children* reports thirty inmates now in attendance. Excellent training is given, but only pay pupils are received. This is said to be the only educational institution in the South which admits epileptics.

*The Maryland Schools for the Blind* and the *Maryland School for the Deaf* have been described in the chapter devoted to educational institutions.

In the counties of Maryland are five local homes for children, of which the oldest is that of the *Female Orphan Asylum of Annapolis*, which was incorporated in 1828. Over one hundred destitute children have been received in this little cottage home, and no death nor serious casualty has occurred among the children in the home during the whole sixty-five years that it has been open. Four inmates are reported at present.

*The Home for Friendless Children of the Eastern Shore of Maryland* reports fourteen inmates, all girls. This institution was established at Easton, Talbot County, in 1871. It is under the management of the Protestant Episcopal Diocese of Easton, and receives annual subscriptions from the different parishes of the Eastern Shore. Older girls are sometimes placed out at service, the wages being kept for them until they are of age.

Two well-kept orphanages, supported by endowments, are located at Frederick. *The Protestant Episcopal Orphan House and Free School of All Saint's Parish, Fredericktown*, is an organization which began work in a log-house in 1833. The institution started as a free school, but the assistance of female orphans soon became a leading object and finally supplanted the day school when that form of charity became unnecessary. An endowment fund, amounting to $32,428, has been gradually accumulated and now supports twelve orphans. Like the Annapolis society, this institution reports that no death, nor even serious illness, has occurred in the home during its whole history.

*The Loats Female Orphan Asylum* was opened at Frederick in 1882, through a generous bequest by Mr. John Loats. The endowment with the building amounts to $40,000. It is managed under the auspices of the Lutheran Church by a self-perpetuating board of trustees.

*The Home for Orphan and Friendless Children* at Hagerstown is a semi-public institution, receiving most of its income from an annual appropriation of $1,500 by Washington county. It was established in 1883, through the efforts of charitable people, for the purpose especially of rescuing destitute children from the demoralizing influences of the almshouse. An endowment of $10,000 was given by Mr. B. F. Newcomer. The children attend a public school, which is conducted in the same building with the Home, and as soon as practicable they are placed out in private families, though remaining under the supervision of the Home till the age of eighteen.

PLACING OUT CHILDREN.

A good institution is better than no home or a vicious home; but it is generally recognized that the artificial, restricted life of the orphan asylum cannot fully take the place of the natural and free home life as the preparation for an active and useful career in the world. In accordance with this idea we find the managers of many of our orphan asylums eager to have their children adopted into suitable families. The Home of the Friendless, St. Vincent's Infant Asylum, the Nursery and Child's Hospital, and St. Mary's Female Orphan Asylum, place out many children by adoption, while older children, who are able to pay their way, are frequently placed at service, with certain stipulations in regard to education and general treatment. In addition to the Home of the Friendless and St. Mary's Orphan Asylum, this form of placing out is employed especially by the German Orphan Asylums, the Manual Labor School, Baltimore Orphan Asylum, the Washington County Home, and all the institutions for colored children. Much attention is now given to the oversight of placed-out children, though more could well be done in that direction. The laws of Maryland allow no contract to interfere with the manifest interests of the child.

But the chief agency for placing destitute children in private families is the *Henry Watson Children's Aid Society.* This organization was incorporated in 1862 as the Children's Aid Society, and assumed its present appellation in 1872, after receiving an endowment of $100,000 from Henry Watson. As reported to the National Prison Congress by Mr. Griffith, this society has received 2,518 children, and secured for them 2,147 country homes, mostly in the counties of Maryland. During the last year forty-eight were placed in country homes and ten in other institutions.

Much care is taken in the selection of homes; but the fact that of those placed out last year, twenty-three had been out before, indicates that it is not always easy to satisfy both the child and its patron. Those receiving children are required to educate them, surround them with Christian influences, support and clothe them well, and give them, on reaching the age of eighteen, fifty dollars as freedom dues. Semi-annual correspondence is maintained with the children, and much care is taken not to lose sight of them; though if the income of the Society would admit of frequent visitation, this important part of the work could doubtless be done more efficiently. Mr. Griffith states the belief "that ninety-five per cent. of the children placed out by this Society in the country homes turn out well," and that "nearly ninety per cent. of those attaining the age of eighteen years, when they are 'free' from this Society, remain in the country."

Granting that the child pays its way in the country home by the increased enjoyment which it brings, if not by the work which it does, the economy of the placing-out system becomes very apparent when we consider that, at $150 each, the yearly cost of maintaining one hundred and seventy-five children in orphan asylums would be $26,250, while that number of placed-out children are now cared for, and several other branches of work are conducted by the Henry Watson Society, with a total annual expense of about six thousand dollars.

In addition to this work of placing out and overseeing children in country homes, the Henry Watson Society provides in its large building on north Calvert street, a temporary home for children, a home for working girls and those seeking employment, and an industrial school for teaching girls to sew and make dresses.

The method of boarding-out children has not been tried systematically in Maryland.

### HOMES FOR WORKING BOYS AND WORKING GIRLS.

To supplement these homes for the support and education of children, Baltimore is provided with a number of charitable institutions which supply a home with favorable surroundings to boys or girls who are at work for wages. Temporary maintenance is often given to those seeking employment, but the regular inmates pay for their board at a low rate. The most notable institution of this kind is the *Boys' Home*, on Calvert street. During the last year a monthly average of ninety-nine boys made this institution their home.

Homeless boys, between nine and eighteen years of age, are received, and a number are committed to the institution by the city magistrates. Positions paying from one to seven dollars per week are found for the boys, and a charge is made for board varying from $1.75* to $2.50 per week, according to the wages which the boy receives. The payments for board cover a little more than one-half the expense of the institution. Clothing is bought at wholesale and supplied to the boys at cost, while all the sewing and mending is done for them through a Ladies' Aid Society. A free night school is in session for seven months of the year, and free instruction in vocal music is also given for the sake of its refining influence. Among the recent improvements may be mentioned the infirmary, and a well-equipped bath-room which provides private bathing apartments for ten boys at a time.

Another institution, similar in design to the Boys' Home, but under Catholic management, is *St. James' Home for Boys*, at the corner of High and Low streets. This home is controlled by the same corporation as St. Mary's Industrial School, and about one-fourth of the inmates are

*If a boy cannot pay this amount a debt is allowed to accumulate.

from that institution. Aside from the payments made by the boys the chief support of the Home comes from a society organized for that purpose and known as the Immaculate Conception Union.

*The Guild House of St. Paul's Parish* also provides a home at low rates for boys and young men whose wages are small.

For working girls we have the *Girls' Home* of the Henry Watson Children's Aid Society, where about twenty inmates are given board, lodging and medical attendance in return for one-half their wages; *St. Vincent's Home for Working Girls*, under the care of the Sisters of Mercy; and several homes for self-supporting young women, in which from $2.50 to $3.00 per week is paid for board and the other benefits of the house. Such homes are *St. Paul's House*, 309 Cathedral street; the *Home for Working Girls*, 25 South High street, under the care of the All Saints' Sisters of the Poor; the *Female Christian Home*, 416 North Greene street; and the Home of the *Young Women's Christian Association*, at 128 West Franklin street. In the year 1892 the last-named home provided for twenty-nine permanent and one hundred and fifty-seven transient boarders.

### MEDICAL AND SANITARY RELIEF FOR CHILDREN.

Several important institutions have been recently established in Baltimore for the relief of sick children. They include two special hospitals, four dispensaries and two sanitariums.

The Nursery and Child's Hospital, with its free dispensary, has already been mentioned.

*The Garrett Free Hospital and Dispensary for Children* on Carey street is a well conducted institution supported entirely by Mrs. Robert Garrett. During the year ending in October 1892, ninety-nine cases were treated in the hospital and about two thousand cases were prescribed for in the dispensary. Five nurses are employed and a course of special training in the care of children is given, on the completion of which certificates are awarded.

During the summer months the hospital is closed, and the *Garrett Sanitarium for Children* is opened at Mount Airy in Carroll county. Free transportation is supplied to sick children and the mothers or nurses who bring them.

Two large cottages, with adjoining buildings, furnish accommodations for twenty-five children, and a resident physician, five nurses, a matron, and seven servants are employed to care for them. Since these institutions were opened in 1888, 266 children have been admitted to the Hospital and 339 to the Sanitarium, 321 surgical operations have been performed, 13,771 cases have been treated in the dispensary, and 833 visits have been paid to the homes of patients.

The *Thomas Wilson Sanitarium* for the benefit of children suffering from complaints peculiar to summer, was opened at Mount Wilson, Baltimore county, in 1884. The institution cost over one hundred and eighty thousand dollars, and derives its support from an endowment of five hundred thousand.

During the summer months a special train left Hillen Station five mornings each week to convey the sick children, with their mothers or nurses, to the Sanitarium. On the first four days of the week white people were accommodated, while Friday was assigned to the colored applicants.

The benefit of pure air, suitable food and special medical treatment were given for the day, and a return passage by special train at evening. Five thousand eight hundred and fifty-one people took advantage of this charity during the last season. Children who were very ill were allowed to remain at the Sanitarium over night, or, if need be, for several days, and when the mothers were not able to remain with them such children were placed in the charge of trained nurses. A longer stay is found to be needed by so many that increased accommodations are called for, and several additional cottages are being erected for use as hospital pavilions. It is announced that during the coming season five trained nurses will be employed in the different sections of the city, each to visit and care for the sick children at their homes within her district, while only those children who need continued treatment will be taken to the Sanitarium, and they will be allowed to remain two weeks.

The other hospitals of Baltimore receive children as well as adults, and some of the hospitals, as the Church Home and Infirmary, provide special wards for them; but the advantages thus offered are not fully utilized because poor mothers, even when unable to care properly for their children, are especially reluctant about placing them in other hands when they are sick.

Another special dispensary for children is located at the corner of Druid Hill avenue and Preston street, and at 407 west Hoffman street is *Miss Barnwell's Dispensary for Plaster of Paris Jackets and Free School for Deformed Children*. This is a unique charity for the benefit of spinal cripples. The method of applying the plaster jackets has been developed from that of Professor Sayre, of New York. Miss Barnwell devotes her time and skill to the work without remuneration, and through the voluntary contributions of friends and patients, an assistant, a teacher, and an examining physician are employed. The day school for children who are so deformed as to prevent them from attending the public schools, was opened in 1889. During the year 1892, sixty-six patients were treated in the dispensary, and twenty-one deformed children were taught in the schools.

At this point of our study, mention should be made of the *Children's Country Home*, the *Children's Summer Home*, and the *Children's Fresh Air Society*, each of which is an agency for giving children of poor people the benefit of two weeks in the country during the heated season. The Country Home is located at Orange Grove, Baltimore County, where about two hundred children were cared for last summer. A new building which accommodates one hundred children at a time has been opened for the summer of 1893. The Children's Summer Home, at Catonsville, is managed by an organization of young women of the Friends' Park Avenue Meeting. The work began last year, and arrangements have been made to accommodate twenty children at a time during the present summer. The Fresh Air Society scatters its beneficiaries among charitable families in country districts. During the two years of its existence, seventy-nine children have been sent out, and plans have been made for extending the charity to one hundred little ones in the coming season.

EDUCATIONAL CHARITIES.

Aside from the purely educational institutions, and the free kindergartens and homes already mentioned, we find in Baltimore a large number of private charities which aim to relieve want and prevent evil by teaching young people to care for themselves. Under this head come the numerous *sewing schools* which are supported by the different church societies of the city. Fifty-eight of them are mentioned in the list of churches appended to the directory of Baltimore charities. Sewing is now taught in all the grammar schools of the city, but these church schools are doing an important supplementary work.

In addition to these local church schools, mention should be made of a few societies whose work covers a broader field and enlists more general interest.

The work of the *Henry Watson Children's Aid Society* in securing homes for children has been described above, but this society is also doing an important service to Baltimore in the line of industrial education through its two branches known as the Sewing Machine Department and the Cutting and Fitting Department. According to the report of the agent, about one hundred girls are in daily attendance at these two schools. The hours are from 9 to 12 and 2 to 4. Only needy girls are received and each pupil retains the garments which she has made.

*St. Joseph's Guild* is a new Roman Catholic community organized in Baltimore five years ago and now numbering sixteen sisters. The purpose of the Guild is to work entirely among the colored people, relieving distress, strengthening the inefficient, rescuing the wayward, and spreading the influence of the Catholic Church. Eight sewing schools have been established by the Guild in different parts of the city,

and about three hundred and twenty-five colored girls are being instructed in them. The work for the most part is rudimentary, but those who care for more technical instruction are encouraged to continue work in a graduate class.

The *Deaconess Home,* on East Pratt street, is the centre of missionary and charitable work on the part of three deaconesses of the Methodist Church. Three industrial schools for girls are maintained, and during the first eight months (February 2 to September 28, 1892) two thousand six hundred and ninety-seven visits were made among the poor and needy. Two deaconesses devote their time largely to visiting the poor while one makes a specialty of nursing the sick. A temporary home for immigrant girls was opened at Locust Point in December.

The *Daughters in Israel* is the name of a society of young Hebrew women organized here in 1890 for work among the Russian refugees. There are a number of separate bands under the general organization. Two industrial schools are in operation, a sewing-school for children and a class in dressmaking for older girls. The latter class is composed entirely of Jewish girls who are actively employed during the day, but are so eager to improve themselves that they attend this class at least three evenings in every week. A working girls' club has also proved to be an important factor in the work of organizing this foreign element. In this as in its other lines of work the society aims to render its beneficiaries self-supporting, self-respecting and independent. The use of any language other than English is discouraged, and the necessity of an American education is strongly impressed upon parents and children.

Two *Night Schools* under Hebrew management are doing an important work in teaching English to immigrants, and various other organizations offer evening instruction to young men and women who are employed during the day.

One of the most interesting of the educational charities is the *Cooking School* connected with the Friends' Mission on Federal Hill. During the past winter a class of forty-five girls has been receiving free instruction in culinary art and many applicants had to be refused. Next year it is proposed to offer these advantages to one hundred school girls, with the hope of interesting the public school board in that line of education. Its importance cannot be doubted when one thinks of the amount of social and economic evil which arises from the lack of skill in cooking.

*Hope Institute,* on Hillen street, with its night school for boys, and classes in cooking, dressmaking and singing, should be mentioned here, as well as the educational work of the *Young Men's Christian Association* and the *Young Women's Christian Association,* though in these

societies the co-operative element is combined with the charitable, and a small fee is usually charged for the benefit of the class work.

Another educational charity is to be found in the *Electric Sewing Machine Rooms*, opened in May, 1891, and now located at 312 St. Paul street. This is a unique institution, and has proved to be an important factor in solving the problems which poverty and inefficiency are constantly presenting to charitable societies. The equipment consists of twenty-six machines run by electric power, a supply of coarse sewing from contractors, and a competent teacher with an assistant. Any indigent woman who wishes to become self-supporting has an opportunity here of earning something at once and of receiving instruction which will, in most cases, enable her to earn living wages in the field of competitive industry. Those who are able pay fifty cents a week for the use of the machines and power, while some who are in especial need are supported through the Charity Organization Society until able to earn their living by their own work.

Eighty women have already been made entirely self-supporting through the benefit derived from this charity. An employment agency has been opened recently, and now a nursery is provided for the care of small children while their mothers are at work. Another room for teaching hand sewing, and lodging apartments for homeless women, are among the additions contemplated by the managers of this growing institution.

In this connection mention should be made of the educational industries carried on in the shops of the *Schools for the Blind*. At the North avenue school, in addition to the industrial training given to the regular students, blind men, are taught to make brooms, and at the Saratoga street school blind colored men are taught chair-caning and mattress making, and are afterward allowed the use of the shops without charge.

*St. Mary's Colored Industrial School* at Charlotte Hall, St. Mary's county, is doing an important work in teaching cooking, needlework, dressmaking, shoemaking and farming, as well as the usual school studies.

## THE REFORMATION OF DELINQUENTS.

In Maryland, as in other States, the last few decades have brought notable improvements in the treatment of those who, through depravity or misfortune, have become amenable to public discipline.

### JUVENILE REFORMATORIES.

The evident harmfulness of confining juvenile offenders with hardened criminals led to the incorporation of the House of Refuge as early as 1831, but nothing definite was accomplished until 1849, when

the Baltimore City Council made an appropriation for the erection of a building. Private citizens, comprising the corporation, gave $67,000, and finally, in 1855, the House of Refuge was opened for the separate care and education of juvenile delinquents. Both boys and girls were received at this institution until after the Maryland Industrial School for Girls (incorporated 1870) was opened at Orange Grove. In 1880, the latter corporation changed its name to the Female House of Refuge, and was soon after moved to its present location within the city.

In the mean time homeless or wayward girls, and especially fallen women, who desired to reform, had been cared for in the House of the Good Shepherd since its establishment in 1864, and in 1878 additional powers were given by the General Assembly of Maryland for the commitment of wayward girls to this institution, and an annual appropriation was granted for its support. Thus reformatories for girls, under both Protestant and Catholic influence, were established; and simultaneously a Catholic reformatory for boys was organized, through the efforts of Archbishop Spaulding, to supplement the work of the House of Refuge, and especially to provide good moral and industrial training for boys who were without proper home influence. This institution, St. Mary's Industrial School for Boys, was opened in 1866, and placed under the care of the Xaverian Brothers. It was conducted for eight years as a private charity, aided irregularly by public appropriations, but in 1874 a new charter was granted which provided for the commitment to this institution as to the House of Refuge, of boys convicted of petty offences. At the same time representatives of the State and Baltimore city were added to the board of managers and regular appropriations were assured.

Thus provision was made for the care of juvenile delinquents of both sexes, under either Protestant or Catholic management, but the fact that neither of these institutions received colored people left a large class of young offenders still exposed to the baneful influences of the common jails. However, public sentiment, aroused especially through the efforts of the Prisoners' Aid Association, was too conscious of the evils arising from such conditions to tolerate them long. The House of Reformation for Colored Boys was incorporated in 1870, and opened at Cheltenham, Prince George's county, in 1873; and the Industrial Home for Colored Girls was opened in Baltimore in 1883, and moved to its present location at Melvale, Baltimore county, in 1888. The division has been carried still further by the establishment in September, 1892, of a new branch of the House of the Good Shepherd, for the care of colored girls.

All these six reformatories are controlled by private corporations, though all are supported chiefly by public appropriation. The House of the Good Shepherd is entirely under the control of the Sisters of the

Good Shepherd, and receives aid from the State only, while the other institutions receive about equal appropriations from the State and city, and recognize public authority in their management through the appointment by the Governor and Mayor of a few of the trustees. In the case of the House of Refuge, a majority of the trustees are so appointed.

All the reformatories receive occasional delinquents, who are sentenced for a definite term, though the most of their inmates are committed to the institutions until of age, the colored girls, at present, becoming free at eighteen, the others at twenty-one.

Excepting the House of Reformation for Colored Boys and St. Mary's Industrial School, which admit none over sixteen years of age, boys and girls are received by the reformatories up to the age of majority; but children committed when under eight are usually transferred to institutions for orphans.

The total number of inmates of these reformatories upon the 30th of June, 1892, was reported as 1,239, but this number included the inmates of the House of the Good Shepherd, most of whom, either on account of their innocence upon the one hand or their age upon the other, do not strictly belong to the class of juvenile delinquents.

With the exception of three-fourths of the inmates of the House of the Good Shepherd, a half-dozen boarders at the House of Refuge and a somewhat larger number at St. Mary's Industrial School, it appears that all the inmates of these institutions have been sentenced or committed by process of law. About one-half of these were committed on the charge of incorrigibility brought against them usually by their parents or guardians. Of the other half the larger part were committed for vagrancy. A number have been convicted of larceny and various offences of a more serious nature, while a few have been committed to the care of the reform school on account of the cruelty of their parents or guardians.

Although commitments may be caused by the fault of the parent as well as of the child, the moral restraint of home life even among the delinquent class is evidenced by the large proportion of orphans among the juvenile offenders. Only three institutions publish statistics upon this point—the House of Refuge, the House of Reformation, and the Female House of Refuge. The last printed reports of these reformatories indicate respectively that 38, 63, and 68 per cent. of the committed youths had lost one or both parents.

In the management of all the juvenile reformatories, the idea of punishment is entirely subordinated to that of education and the establishment of moral character. About equal time is usually given to school work and manual labor—the latter being utilized for the partial

support of the institution through contract work. Industrial training is also given to some extent in all the institutions.

When sufficient training has been received and the inmate is deemed trustworthy, he is usually released on a ticket of leave or apprenticed with a suitable family under the oversight of the institution. Of these outside wards, still under the jurisdiction of the reformatories, the House of Refuge reports two hundred and sixty-one; St. Mary's Industrial School seven hundred and forty-five; Female House of Refuge fifteen, and the Industrial Home for Colored Girls sixty. After this general outline of the history and management of the juvenile reformatories, a few words will be added concerning the individual features of each institution.

*The House of Refuge* occupies a massive stone building near the western limits of the city. The surrounding wall and the jail-like cells remind one of a prison, though the management of the institution is not punitive but thoroughly educational.

The forenoon is occupied with work in the overall shops and elsewhere, while the afternoon is devoted to studies. The common English branches, including history and elementary physiology, are taught, and a good supply of current literature is provided for evening reading. Through a special appropriation of $10,000 by the Baltimore City Council, a Manual Training School was established in 1891, and an equipment provided for teaching wood work, metal work and printing. The interest shown by the boys in the manual training can leave no doubt of its value as a factor in reformatory work, and it is to be hoped that it will be sustained by regular appropriations.

No boy is dismissed from the institution until a good home and suitable employment has been secured for him, and a special visiting agent is employed to look after the interests of the outside wards.

*St. Mary's Industrial School for Boys* is located upon a fruitful farm of one hundred acres about a mile to the south from the House of Refuge. Compared with the House of Refuge, we find in this institution a larger number of boys, with a lower average age, many boys being committed because destitute rather than delinquent. A large five-story stone building provides dormitories, school-rooms and chapel, while the adjoining shops and green-house supplement the farm in furnishing manual employment for the boys. Knitting hose, tailoring, printing, carpentering and shoemaking are the industries in progress, in addition to the care of the farm and buildings. Much industrial training is thus secured, and the educational element in the manual labor is developed as far as the income of the institution will admit. Among the branches taught in the school-rooms we find history, physiology and book-keeping, and instruction in drawing is given to all the inmates. Vocal music is

taught to a limited class and a large band is in training. When a boy is thought to be prepared to leave the school he is usually returned to his parents or provided with a suitable home in a private family, but many boys for whom such homes are not at hand continue under the care of the Xaverian Brothers in the St. James' Home for Boys, which has been mentioned as one of the homes for working boys.

*The House of Reformation for Colored Boys* is an interesting institution peculiar to the State of Maryland. A farm of eight hundred acres, forty-three miles to the south from Baltimore, forms the material environment of the reformatory and furnishes a large part of instructive employment which is needed. The most distinctive feature of this institution is the arrangement of buildings upon the family plan. In the place of one large dormitory five family buildings furnish accommodations for fifty boys each. Each building contains a separate school-room, hospital, and play-room, and is under the immediate care of a teacher who resides in it. This plan permits of gradation, and the boys are stimulated by promotion from one building to another as they advance in proficiency. In addition to these brick family buildings, are several shops and a large administration building, one wing of which is occupied by the superintendent, while the other furnishes large dining-rooms where all the inmates of the institution take their meals. Four and one-half hours of the day are devoted to school work and the same length of time to manual labor. A stocking factory furnishes employment for about one hundred and twenty of the younger boys, while carpentering, blacksmithing, baking, painting, tailoring, and shoemaking are some of the industries which occupy the older boys. Although none are received over sixteen years of age, the buildings are always crowded, and the lack of room often necessitates the dismissal of boys earlier than would otherwise be thought best.

*The Female House of Refuge*, on Carey and Baker streets, shelters about seventy girls. Industry is the chief factor in the work of reformation, and thirty-six sewing machines are kept busy all day making underwear for contractors. The net proceeds of the sewing-room amounted last year to nearly three thousand five hundred dollars. A record is kept of the work done by each inmate, and one-half of its proceeds is placed to her credit in a savings bank. The work of so large a household gives an opportunity for valuable industrial training, and a sewing teacher, as well as a school teacher, is employed. Girls who are considered trustworthy are often placed out at service, though remaining under the control of the institution till of age. An auxiliary board of fifteen women assists in the management of the reformatory.

*The Industrial Home for Colored Girls* is similar to the Female House of Refuge in purpose and methods. A new building has just been

erected, which increases the capacity of the institution to one hundred and twenty-five and adds much to the comfort of the inmates. Making overalls is the chief remunerative industry. During the last year the girls earned about $5,000, of which $238 was placed to their credit for over-time work. Many of them, after receiving some training, are apprenticed out with good families on condition that they be well cared for and given twenty-five dollars and an outfit on reaching the age of eighteen. Such careful training is given the girls in all branches of housework that their services are always in demand in good homes as soon as they leave the institution. Whatever methods may be employed, the efficiency of a reformatory in really elevating the character of its inmates must depend largely upon the personal qualifications of those who are placed in charge, and the managers of the Industrial Home seem to have been fortunate in securing an unusually capable superintendent.

*The House of the Good Shepherd* occupies a whole block in the western part of Baltimore, and, like many of the older Catholic institutions, is secluded from the outside world by a high brick wall. It is in part co-ordinate with the other reformatories for girls, though quite different in some of its features. There are three distinct departments—the preservation department, the reformatory, and a community of Sister Magdalens. In the preservation department are about one hundred girls of all ages from four or five years to twenty or over. The preservation of innocence seems to be the leading purpose of this department. Most of the girls are brought here by their guardians or friends, though many are committed by the magistrates for vagrancy, destitution, or the want of proper home influences. The day is devoted chiefly to housework and sewing, while school work occupies the evening.

The reformatory department is for girls and women who have committed some misdemeanor. A few girls are committed to this deparment, as to the other reformatories, till they reach the age of majority, but the most of the inmates are fallen women who are brought in by parents or friends, or who come voluntarily with the purpose of reforming. There is no age limit and many of the inmates are mature women. Sewing is the regular occupation.

The Community of Magdalens is a sisterhood of thoroughly repentant women, who have chosen to spend the remainder of their lives in industry and religious devotion within the walls of the institution.

The total income from the work of inmates of the institution for the last year was $18,748.43.

The *House of the Good Shepherd for Colored Girls* is a branch of the older institution recently opened at Calverton Heights, near the western limits of the city. About thirty incorrigible colored girls have

been left under the charge of the sisters there, and the next Legislature is expected to recognize the institution as a public reformatory.

The Sisters of the Good Shepherd, who control these reformatories and similar institutions in all parts of the world, form a sisterhood which was organized for this purpose in 1642, and has its "mother house" at Angers, France.

Another institution, which may be mentioned in connection with the House of the Good Shepherd, is *The Home* for fallen women, on Exeter street, where seventy unfortunate women have found shelter and religious influences during the past year. Residence in the home is entirely voluntary, and is often brief, but many are helped to a higher life. Industrial training is given, and honest employment is found for those who are ready to leave the home.

The *Helping-up Mission* at Arch and Baltimore streets is doing reformatory work among the same class of women in West Baltimore.

PRISONS.

Continuing from the juvenile and voluntary reformatories we come to a class of institutions which have but recently taken on the character of charities, and are still commonly regarded as means for vengeance rather than for charitable effort. For the true position of prisons does not appear till we come to recognize on the one hand that it is truer charity to upbuild men than to indulge them, and on the other hand that the most efficient punishment is that which reforms the offender.

In Maryland, as in other States, the treatment of adult offenders is far behind this conception of the purpose of punishment, for it is the character of the past crime, instead of the progress of the reformation, that determines the time when the prisoner shall be released. Yet while much remains to be accomplished in the improvement of criminal law and practice, the principle of reformation, as applied to adults, as well as to minors, has been recognized in the general laws of Maryland, as well as in the management of the individual prisons. Especially a law passed in 1876 allowing a commutation for good behavior of four days from each month of a sentenced term of imprisonment is said to have given excellent results. In the treatment of criminals while enduring confinement, their reformation is constantly held in view.

There are now three prisons that receive adult criminals from the courts of Baltimore—the Baltimore City Jail, the House of Correction and the Maryland Penitentiary. The first is supported and controlled by the city, while the two others are State institutions. Of the fourteen hundred prisoners confined in these three institutions almost one-half are colored (though the colored population of the State is only one-fourth of the white); and about ten per cent. are women. The white race

predominates in the jail, while a large majority of the penitentiary convicts and of the female inmates of all the prisons are colored. Among these prisoners are always a number of minors, who have been committed to these institutions because they were deemed unsuitable for the juvenile reformatories, or because the reformatories were too full to receive them.

All these prisons are under capable and progressive management. The management of the Penitentiary especially, receives very high praise from recognized authorities upon the subject of penology. Industry everywhere prevails, cruelty or neglect is not tolerated, and all gross abuses have been removed. Except at the House of Correction, the women are confined in buildings by themselves. Moral and religious influences are brought to bear upon the prisoners, and the officers in charge make reformation the object of their efforts. In the way of economic management little more could be asked, for the total expense per capita for the last year was but $114.22 for the Jail, $105 for the House of Correction, and $119.08 for the Penitentiary, and a large part of this expense was met by the work of the inmates. Although an abundance of good nourishing food is given, the average daily cost for food is reported at seven and two-third cents for the Jail, five and one-fourth cents for the House of Correction and seven and one-fourth cents for the Penitentiary.

*The Jail of Baltimore City* is an imposing stone building lying to the east of Jones' Falls. From ten to eleven thousand men and women are committed to this institution each year; about three-fourths of them are imprisoned for drunkenness and disorderly conduct. The average daily population for the year 1891 was four hundred and ninety-seven; for the year 1892, four hundred and sixty-seven. This decrease is assigned by the Warden to the action of a new law respecting the "drunk and disorderly" cases which commits them, in default of the payment of fine, for only seven days for the first offence, with an increasing term for subsequent commitments within a period of sixty days. Since 1889, one hundred of the prisoners have been employed under contract in a basket factory, while the others are utilized to a large extent in making repairs and doing the routine work of the institution.

*The House of Correction* is a State prison for short-term offenders where the idleness of the county jails is replaced by hard work. The recognized need of such a prison led to an appropriation in 1874, of $250,000 for its establishment, and the institution was opened at Jessup's, Anne Arundel county, in 1879. The average population of the prison is about two hundred and seventy-five. The brevity of the terms of imprisonment interferes with the best results from the labor of the convicts, but an income of about $9,000 from contract work is reported for last year. Chair-caning and covering demijohns are the present

employments, but it is expected that more important industries will soon be introduced.

*The Maryland Penitentiary* is the State prison for long-term offenders. It is located in the heart of the city, adjoining the Baltimore Jail. Little of it can be seen from the street except a high wall with pavilions for watchmen. Within we find a well-organized industrial establishment, in which each inmate is assigned a place suited to his strength and capacity. Out of an average population of 652 about eighty are assigned to the various tasks which the maintenance of so large an institution requires, while an average of 569 are employed by contractors. In order to suit the varying capacity of the different convicts three lines of manufacturing are conducted within the prison walls, comprising a hollow-ware foundry, marble works and a boot and shoe manufactory. The prisoners remain under the supervision of the warden, and the best discipline prevails. The proceeds from the contract labor amounted last year to over seventy-nine thousand dollars, and more than paid the entire expense of maintaining the prison. After the regular day's labor of eight hours has been completed an opportunity is given for over-time work, and the earnings are placed to the credit of the prisoner. The amount thus gained by the prisoners during the year ending November 30, 1892, was $10,208.51. Prisoners may draw upon their earnings for the support of families outside or may allow the account to accumulate till they are discharged. The Bertillon system of measurements for the identification of criminals has been recently introduced.

### COUNTY JAILS.

It may be doubted whether the county jails should be treated under the heading of "Reformation of Delinquents," for it must be acknowledged that but few criminals are freed from their evil purposes by confinement in the jails. Yet the county jails have felt the wave of reform, and none of the gross abuses which were common fifteen years ago are now tolerated. The sexes are completely separated, the insane are removed to asylums, and children are sent to reformatories.

Each of the twenty-three counties has a jail located at the county seat. The aggregate cost of these jails as reported for the World's Fair charts was $351,968. The aggregate average number of inmates was reported at 249. The jails at Cumberland, Easton, Frederick and Elkton, may be mentioned as especially well constructed and managed. The management of the jails is vested in the sheriffs of the respective counties, though in about one-half the counties the sheriff appoints a warden to have immediate control of the building and prisoners.

### AID FOR PRISONERS.

As stated at the opening of the chapter, a large share of the advancement which Maryland has made in penal and reformatory methods has been due to the influence of the *Maryland Prisoners' Aid Association*, a private association supported by annual subscriptions, but recognized by law and given full powers of visitation in respect to all the penal institutions of the State. But, while much is done in behalf of prison reform, the work of the association is primarily with the prisoner rather than with the prison. Its objects are concisely stated in a circular as follows:

"To afford prisoners moral and religious instruction.

"To furnish them with Bibles and other elevating literature.

"To teach the illiterate how to read and write.

"To furnish discharged prisoners with necessary clothing and tools, and, when possible, with employment.

"To send those living out of the city to their homes.

"To visit the sick or impoverished families of prisoners and to supply their immediate needs."

The agent of the Association, an ordained minister, is constantly engaged in this work of reclamation. One or more of the prisons is visited every day for personal interviews with prisoners, and religious services are conducted every Sunday. Frequent visits are made to the reformatories also, and to the county jails and almshouses. But it is at the critical time when a man regains his freedom that the friendly help of the Prisoners' Aid Association is most needed. The acquaintance which has been gained during the term of imprisonment gives mutual confidence, and very many ex-convicts have thus been started in an honest course, which they have followed for the remainder of their lives.

### THE PREVENTION OF VICE AND CRIME.

Another chapter has described the chief factor in the suppression of evil through the cultivation of higher motives—the Christian Church. The Police Department also, which may be regarded as the chief outward factor in the prevention of crime, does not come within the scope of this chapter, and the work of the Society for the Protection of Children, of the orphanages, and of the reformatories and prisons, which aim to be preventive as well as curative, is spoken of elsewhere, yet a few other societies remain for our consideration under this head.

*The Society for the Suppression of Vice of Baltimore City* has been actively at work since 1888 in securing better laws for the promotion of the moral well-being of the community, and especially in gaining the enforcement of existing laws respecting the liquor traffic, gambling, and indecent writings and pictures.

*The Woman's Christian Temperance Union* in Maryland is carrying on the same warfare with social evils, which characterizes its activity in other States and countries. The State building, costing about $30,000, is located at No. 8 South Gay street, where a free kindergarten, mothers' meetings, and other lines of social work are carried on. A branch of this organization, known as the *Memorial Union for Preventive and Rescue Work*, was formed in 1890 for the protection of homeless girls. Such girls are provided with a temporary home, and employment is found for them. In pursuit of the rescue work members of the Union visit the railway stations, police stations and the city jail, and a committee is appointed for visiting the homes of the very poor in the interests of destitute children.

The temporary *Home for Immigrant Girls*, recently opened at Locust Point by the Methodist deaconesses, should be mentioned here, as well as the work of the Daughters in Israel, already described.

The *Hebrew Friendly Inn*, on East Lombard street, also provides a free temporary home for large numbers of immigrants, both men and women, and the *Port Mission Home for Seamen*, opened in 1892 on Thames street, offers religious surroundings to sailors while in port. The Home is supported in part by charity, though the payment of board is expected.

Several other religious societies are combating the evil influences of the city by purely religious work combined with more concrete forms of charity. *The Baltimore Female City Mission* has been actively at work since 1865. Five agents are employed who visit destitute homes, distribute food and clothing, and secure employment for some who are out of work. The annual report speaks of closing five saloons and houses of ill-fame.

*The Rescue Association of Baltimore City*, formerly known as the Free Sunday Breakfast Association, is continuing the work among homeless men, which was begun by its president, Mr. Blackburn, in 1890. During the winter coffee was served every evening in the chapel of the old Associate Reformed Church, on Fayette street. Following this refreshment was a religious meeting, with an average attendance of about one hundred destitute men, and during the cold weather large numbers took advantage of the privilege granted them of sleeping upon the bare floor of the hall. In order to keep the converts under helpful influence, Rescue Home was opened for their accommodation at No. 109 Marsh Market Space. The inmates of this Home, from thirty to forty in number, either pay their board or obtain tickets which are paid for by others.

Plans have been formed for moving the mission work to Market Space, and introducing an industrial feature as a help toward the redemp-

tion of those who are looking upward, and also as a work test for trying the motives of applicants for relief. A building has been leased (June, 1893,) for this purpose at the corner of Market Space and Hawk street.

An organization has been formed recently for maintaining an *Industrial Home for Women*, with a view to placing vagrants in the way of self-support. The home has been opened at No. 706 West Lombard street.

Important factors in lessening the influences of saloons are the numerous *Free Reading Rooms* and *Club Rooms* conducted by religious societies. Seven of these are supported by the *Young Men's Christian Association.* Among the others mention may be made of Hope Institute, already spoken of, the *People's Institute,* managed by the Memorial Presbyterian Church; the *Port Mission Reading Room* for sailors, at 815 south Broadway; another reading room, similar in purpose, recently opened on Aliceanna street, by the *Seamen's Union Bethel Society*; the *Newsboys' and Bootblacks' Club Rooms* at No. 218 East Baltimore street, and *Emmanuel House,* recently opened, (April 4, 1893), on Calvert street, where, in connection with the free reading rooms, meals and lodgings are furnished at a low rate.

The most recent movement for the improvement of social conditions in Baltimore resulted in the organization, on the 19th of June, 1893, of *The Union for Public Good,* having for its purpose "to promote the good government, health and prosperity of the City of Baltimore, to secure useful and prevent injurious legislation affecting its interests, to correct public scandals, grievances and abuses, to restrain all forms of vice and immorality, and to encourage the co-operation of individuals and existing societies aiming to advance these ends." It is organized as a union of societies, and every congregation or society having for its object the moral or social improvement of the community, is invited to become affiliated to the Union, and to be represented at its meetings.

### THE MANAGEMENT OF TRAMPS AND BEGGARS.

Short-sighted generosity has interfered somewhat with the successful treatment of these social parasites, though stringent laws have been passed for the suppression of vagrancy. However, begging in public places is now confined for the most part to the blind or crippled who offer pencils or matches for sale, or present some other form of exchange.

Tramps in large numbers spend the winter months in the city almshouses, where about one-fourth the inmates are people who, according to their own report, had lived in Baltimore less than six months. At the station houses of the police department 20,611 free lodgings were given to tramps in 1892; and throughout the State, but especially in the northern counties, many of these vagrants find free accommodations at the alms-

houses and jails. During the past winter, however, this evil has been greatly relieved in Carroll, Frederick, and some other counties by requiring all tramps to earn their maintenance by working on the roads.

Within the city the Free Sunday Breakfast Association, as already stated, has been trying to restore this class of men to useful lives through charity and religious conversion, while the *Friendly Inn*, on South Sharp street, aims to remove the necessity of free lodgings, with their pauperizing tendencies, by granting meals and lodgings in return for work in a wood yard. Fifteen cents in cash, or an order from some subscriber who pays the bill, is accepted in place of the labor. During the last fiscal year 18,669 lodgings were furnished, of which 10,235 were worked out. Though contrary to the designs of the institution, some forty or fifty men have hitherto made this their home for the winter. The others usually remain but a few days, and in the summer the building is nearly empty. A laundry and free shower baths secure outward cleanliness for the inmates, and religious meetings are held for their spiritual regeneration. The management of the institution has been improving for some time, and it seems destined to become the chief factor in the solution of the tramp question for the city.

### THE RELIEF OF WANT AND PREVENTION OF PAUPERISM.

The idle and shiftless pauper, who has given up all effort toward self-support, and is watchful only for largesses, is everywhere recognized as a menace to the welfare of society. If he does not himself fall into dissipation and crime, his children are pretty sure to do so, and the total effect of his life is to place a brake upon social progress. It is not without justification, then, that the prevention of pauperism is made co-ordinate with the relief of immediate distress as a leading object of charitable effort. The rendering of aid to the needy may be prompted simply by the spirit of humanity, but it is ultimately justified by its effect in giving strength and courage for renewed effort and higher attainment. The problem of pure relief, however, is made difficult by the fact that alms, when carelessly given, do not always strengthen the recipient, but are quite as likely to weaken his moral nature and induce him to exchange self-help for parasitism.

This difficulty is now recognized to some extent by all the relief-giving societies of Maryland, and, while many distributing agencies are doubtless too careless in their methods, all are at least striving to prevent pauperism by giving the aid that will be truly helpful.

A leading motive in much of the work already described is the prevention of pauperism. This is especially true of the Electric Sewing Machine Rooms, and the other educational charities. The charities which remain to be treated under this heading fall, for the most part

into three groups, having for their main purpose respectively, the securing of work for the unemployed, the encouragement of provident habits, and the granting of needed relief. This classification leaves the Charity Organization Society for treatment by itself.

In the first group belongs the *Women's Industrial Exchange*, on Charles street, where any needy woman may enter her work for sale, subject to the rules of the Exchange. A large business is done in all kinds of sewing, but the most lucrative branch of work is the cooking. A lunch room is connected with the exchange, from which the receipts amounted last year to $6,489, while the receipts in the store exceeded nineteen thousand dollars.

The *Decorative Art Society* offers similar advantages for the sale of meritorious work in the line of painting, designing, and embroidery. Instruction is given in these branches of art, and a number of free scholarships are granted.

Among the important helps in the prevention of pauperism are the *Employment Bureaus*. The private bureaus, which are managed for profit, deal successfully with applicants who are efficient and have good recommendations, but the indigent, the inefficient, and the wayward need more personal attention than the commercial bureaus find profitable to bestow, and, as a result, many fees are paid in vain by those who are most in need. Only charitable effort can meet this difficulty fully, and a large number of the societies described in this chapter devote some attention to finding employment for their beneficiaries. This feature has been recently introduced by the "Poor Association," and the Electric Sewing Machine Rooms. The German Society, the Young Men's Christian Association and the Young Women's Christian Association have regular employment bureaus, the last-named society charging fifty cents to employers only. But the chief agency for finding employment for the needy is the Charity Organization Society, whose work will be considered later.

Among the agencies for encouraging provident habits among the poor, mention should be made of the *Thomas Wilson Fuel-Saving Society*, an endowed charity, having for its object: "To encourage those who have but little money, to lay by small sums during the summer for the purchase of coal in the winter at reduced rates, and to aid women in the purchase of sewing machines upon easy terms of payment." Payments of any amount above five cents are accepted from eligible applicants, and when full payment has been made for coal it will be delivered in loads of one-quarter ton or more, at the rate of five dollars a ton. Sewing machines are delivered before full payment has been made, but are subject to recall.

The *Provident Savings Bank*, though organized upon a paying basis, was started by charitable people and designed to better the condition of the poor. The stamp-card system is in use, through which deposits may be made in amounts as low as five cents. In order to extend the benefits of the institution, some fifty agencies for the sale of the deposit stamps have been established, mostly at drug stores; and eleven branch offices, nine in the city, one at Sparrow's Point, and one in Cecil county, are opened at least once a week for withdrawals and the reception of the larger deposits. At the Central Office, on the corner of Howard and Franklin streets, a regular savings bank business is done.

*Public Outdoor Relief* is confined in Baltimore to an appropriation of $1,000 for the transportation of indigent people to their homes or friends in other places. Only about three-fourths of this appropriation was expended last year.

Outside of the city, however, an extensive system of outdoor relief prevails in the form of *Pensions from the County Treasuries*. The rule, in some of the counties at least, is to grant a pension to anyone who gets five freeholders to certify that he is not able fully to support himself by his own efforts. According to the reports received from county officers nearly 2,800 people are receiving these pensions, varying much in amount, but averaging $17.20 each. Allegany county alone grants no pensions.

Aside from the free transportation, the nearest approach to public out-door relief in Baltimore is found in the private contributions distributed to the poor through the *Police Department*. Two-thirds (in value) of the contributions are in cash, but all are distributed in the form of provisions, fuel and clothing, or of orders upon the dealers in those supplies. The supplies are dealt out at the police stations on the orders of the patrolmen, the guaranty against harmful subsidies being the personal acquaintance of the patrolmen with the poor people upon their respective beats. During the year 1892, distributions were made in this way to the amount of $4,516. But during the brief period from January 1 to March 3, 1893, no less than $16,297 was given out through this agency.

The exceptionally severe weather of the past winter interrupted many of the industries, especially the oyster dredging, which usually employ thousands of men during the winter months. Destitute men flocked to the city in great numbers, and the resulting distress called forth an unprecedented wave of charity. In addition to the relief given through the Police Department and extra work done by all the relief-giving societies of the city, eight or nine stations were opened for serving free soup to the hungry poor. For this purpose the *Winter Relief Association* was organized. Eight two-barrel soup caldrons were pur-

chased and located at five stations, where, within the month from January 16 to February 16, nearly 25,000 gallons of soup were made with a total cost of $1,316. The soup was served once a day, and during a part of the month as many as 6,000 persons were supplied. The number of applicants was reduced by instituting an investigation of each case, and gradually fell away to one hundred and sixty-five on the 16th of February, when the distribution ceased.

Returning from this special flood of relief to the permanent stream of charitable effort, we find in Baltimore as many as twenty societies which, in addition to the church charities, are supplying poor people with food, fuel and clothing by an annual expenditure of about eighty thousand dollars.

Of these societies the leading one is the *Baltimore Association for the Improvement of the Condition of the Poor*, whose origin and purpose have already been described. The chief work of this association is, at present, the direct relief of the poor by supplying them with fuel and groceries. Of the $18,600 thus expended during the last fiscal year, about $7,400 was spent for fuel, distributed in the winter only, $6,300 for groceries, provisions, etc., and $4,900 for operating expenses. The association is supported chiefly and managed by annual subscribers under a thorough organization. For the better administration of the charity the city is divided into four districts, in each of which is an office of the association and a paid agent, who investigates all cases of want reported within his district, and attends to the distribution of the relief. The agents become acquainted with the recipients of their charity, and thus not only avoid much wasteful and harmful giving, but also, to some extent, uplift the poor by their personal influence.

In order to increase this element of personal contact, a system of friendly visiting like that of the Charity Organization Society was introduced last year; or, rather revived, for in former years the entire work since intrusted to paid agents was done by volunteer visitors. The visitors for each district are appointed by the President. The new system proved especially successful in the northeastern district, where about twenty visitors, mostly women, are at work, each having about a dozen families assigned to her care. As in the German system of poor relief, all the families of a given locality are assigned to one visitor.

The other relief-giving societies must be passed with but few words concerning each. Nearly all of the first group are religious societies, and many are denominational, though their charity usually extends beyond the bounds of the denomination which supports them. A second group of societies observe the lines of nationality and grant relief to those who are bound by the ties of a common fatherland or a common ancestry.

The *Young Catholics' Friend Society* assists several hundred Catholic children with clothing and instruction, and manages the Dolan Children's Aid Asylum.

The *Society of St. Vincent de Paul*, of Baltimore, is a branch of a general Roman Catholic organization having its centre in Paris. The primary object of the society, as stated by its president, is the sanctification of its members through sympathetic work in behalf of the needy. Thirteen conferences of the society are connected with the Catholic churches of the city, and are actively engaged in visiting and relieving the poor, and extending the influence of religion over the lives of the destitute and wayward. One conference is located at Cumberland, Md., and under the central council of Baltimore are thirty-three other conferences located at Washington and in the other South Atlantic States.

The *Ladies' Special Relief Association of South Baltimore* is doing an important work in its locality. The poor are visited and given general relief.

The Order of the *King's Daughters* has over one hundred circles in Baltimore and the counties, and nearly all are engaged in some charitable work.

The *Friends' Lombard Street Benevolent Society*, an incorporated society connected with the Park Avenue Meeting, has a visiting committee of twenty members who work among the poor, giving clothing and other relief which the Society supplies.

Many similar societies are connected with the different churches in Baltimore and all parts of the State.

The *Society for the Relief of Widows and Orphans of Seamen*, organized in 1827 and incorporated in 1883, is connected with the Seamen's Union Bethel. Twenty-five or thirty needy widows of seamen are pensioned during the winter months.

The *Charitable Marine Society*, incorporated in 1796, pensions needy widows and orphans of deceased members, and relieves members who have suffered from shipwreck or otherwise.

The *Beneficial Association of the Maryland Line* grants relief to ex-Confederate soldiers, according to the discretion of the visiting committee. The funds for this purpose are derived principally from annuities purchased with the proceeds of "The Confederate Bazaar," held some ten or twelve years ago.[1]

Many other beneficial societies grant relief to members and their families.

Intermediate between the religious and the national societies are the Hebrew organizations.

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The *Hebrew Benevolent Society* has a membership of seven or eight hundred annual subscribers, and during the last year expended $21,411 in various forms of relief for the poor. The city is divided into six districts, in each of which are three managers who investigate the applications from their respective neighborhoods. A banquet is held every year at which large sums are contributed, in addition to the regular membership dues.

The *Hebrew Ladies' Sewing Society* is associated with the preceding organization, though under entirely distinct management. Clothing, shoes, and provisions are given in large quantities.

Since July, 1890, over eighteen thousand dollars have been expended by the Baltimore committee of the *Baron de Hirsch Fund* for the relief of Hebrew immigrants. The report of this committee for the ten months from July, 1892, to May, 1893, is as follows:

| | | |
|---|---|---|
| 32 | Taught trades and established in business | $ 631 50 |
| 11 | Supplied with tools | 160 46 |
| 40 | Supplied with furniture and goods | 533 06 |
| 389 | Transported | 2,379 32 |
| | To the English night schools | 970 00 |
| | Agent's salary, sundries, and office expenses | 681 84 |
| | Total | $5,356 18 |

The *German Society of Maryland* is the most distinctively charitable as well as the largest of the national societies. Over five thousand dollars are annually expended in the relief of the poor, and an experienced agent is employed to administer the charity and investigate all applications for aid. Relief is given chiefly in the form of money, medical treatment, or employment. Work was found for three hundred and thirty-three persons during the last year.

The founders of *St. Andrew's Society*, which was organized in 1806, expressed the motive of the organization in the following language*:

"When people fall into misfortune in any part of the world, remote from the place of their nativity, it is natural for them to make their distress known to those originally from the same country; the presumption in this case is, that the love of the native soil, which is inseparable from every human breast, will make their countrymen more ready than others to administer to their relief, and that possibly some may be found among them with whom they are connected by blood, or who know something of their relatives.

"For these reasons the natives of Scotland and those descended of Scotch parentage, in the city of Baltimore, have formed themselves into a charitable society, the principal design of which is to raise and keep a sum of money in readiness for the above benevolent purpose."

* Report of St. Andrew's Society for 1892.

The same motive, together with the desire to promote social intercourse, led to the formation of *St. George's Society of Baltimore*, for the relief of indigent natives of England, Wales and the British colonies; the *Hibernian Society of Baltimore*, for the assistance of emigrants from Ireland; and the *Société Française de Bienfaisance de Baltimore*, for the relief of needy French people who may be in the city. St. Andrew's Society has permanent investments valued at $35,616, and the Hibernian Society, which was founded as early as 1803, has charge of a fund of $25,000, bequeathed by John Oliver in 1826 for the support of a free school. The fund is used in maintaining an evening school for boys.

The long list of independent charities working in the same field, each with but partial regard to the work of the others, suggested the need of a central organizing bureau where the work of the different societies might be recorded, duplications and deficiencies revealed, and the efficacy of all increased. Such was the leading motive in the establishment, twelve years ago, of the *Charity Organization Society*; but, like the associations bearing the same name in other cities, the Charity Organization Society of Baltimore has developed many lines of beneficent activity in addition to the work of co-ordinating charities. Under the head of "objects" we find the following statement in the last annual report:

The specific objects and methods of the Charity Organization Society shall include:

1. The promotion of cordial co-operation between the municipal authorities, benevolent societies, churches and individuals, thus effectually checking the evils of overlapping of relief caused by simultaneous but independent action.

2. Such a system of visiting and inquiry as shall insure an accurate knowledge of the condition of each applicant for relief.

3. A careful system of registration that shall make the results of these inquiries available to all.

4. The application of correctional influences to all able but unwilling to work; the training of all unable to work in institutions or homes; and the counteraction of hereditary pauperism by wholesome educational influences for the young.

5. The prevention of imposture by duplication or otherwise, and the exposure of habitual beggars and frauds.

6. Employment or other suitable relief for all deserving applicants.

7. The organization of a body of friendly visitors who shall be faithful personal advisers and friends, gradually build up habits of industry, saving and self-control among the less fortunate, thus preserving and elevating the home.

8. The provision of temporary employment as a work-test, and the promotion of industrial education.

9. The collection and diffusion of knowledge on all subjects connected with the administration of charity and the maintenance of a free library of information on these subjects.

The equipment for the accomplishment of these objects consists in (1) a central office, where the general secretary and several assistants are engaged in the general management of the society, keeping complete records of all the cases helped by the society or reported from other societies, and attending to transient applicants for relief; and (2) seven

branch offices, each of which is a centre of organized personal work in behalf of the poor within its district. In each district is a paid agent, who may be found at the district office for consultation during certain hours, but who spends most of the day in investigating new cases, visiting old ones and doing whatever he can to secure the true welfare of the poor. As assistants to the agents there are in all two hundred and forty-three volunteer visitors, to each of whom is assigned at least one needy family for his continued personal care. The visitors of each district meet weekly for discussing the varied questions which arise, and deciding what action should be taken in individual cases. This board of visitors, especially its chairman and case committee, oversees the work of the agent as well as that of the volunteers.

Realizing that careless almsgiving does no more than mollify, and often even aggravates the evil which it aims to relieve, the Charity Organization Society asks the co-operation of all charitable people, so that, after careful investigation, the relief may be made efficient and adequate. The causes and conditions of distress are found to be so variable that the form of relief best adapted to the conditions must be separately decided for each case. Any pressing want, such as the lack of food, is at once relieved on the first visit of the agent, and then the more difficult task of removing the cause of the distress is undertaken. In many cases employment is all that is needed, but more often some weakness in the character, perhaps merely laziness, has to be contended with. Others need industrial training, hospital treatment, legal advice, or sometimes simply encouragement and sympathy. For supplying the most of these and countless other needs the personal, active friendship of the agent and the visitor is the main reliance.*

The Charity Organization Society does not aim to give direct relief in money or commodities, but a small fund is provided for emergencies, loans and other cases. When continued financial aid is thought advisable it is obtained by interesting some charitable individual, church, or society in the case.

Something of the scope of the Society's work, as well as its recent increase, is indicated by the following statistics:

| | Six months Ending April 1, 1893. | Twelve months Ending Nov. 1, 1892. |
|---|---|---|
| Total applications | 7,164 | 7,769 |
| Aid procured for | 2,260 | 2,004 |
| Employment found for | 1,055 | 1,047 |
| Loans made to | 47 | 56 |
| Transportation obtained for | 51 | 77 |
| Placed in institutions | 76 | 125 |
| Impostors exposed | 175 | 311 |
| False addresses discovered | 191 | 290 |
| Visits made to the homes of the poor by friendly visitors and agents | 8,239 | 10,935 |

*Both men and women act as volunteer visitors. All but one of the agents are women.

A new quarterly publication—the Charities Record—is published by the Society as an exponent of the charitable work of Baltimore.*

Among the relief-giving societies in the counties of Maryland mention may be made of the *Charity Organization Society of Cumberland*, which has been established during the past year for the more efficient treatment of dependents and mendicants in that city, and the *Charity Society of Annapolis*, which is dealing with the same problems at the Capital of the State.

MEDICAL AND SANITARY RELIEF.

The special medical and sanitary relief for children has already been described.

Public activity for the prevention of sickness and disease is chiefly manifested in the *Health Department* of the city government. The principal lines of work undertaken are: (1) the collection of vital statistics; (2) investigating and abating nuisances dangerous to health; (3) the removal of filth; (4) the inspection of plumbing and drains; (5) the maintenance of a quarantine station and hospital; (6) vaccination against small-pox; (7) the prevention of the spread of infectious diseases through isolation and disinfection, and (8) the maintenance of a morgue and two public cemeteries.

Through the activity of the Baltimore News, aided by the chemists of Johns Hopkins University, public attention has been called (May, 1893,) to the deficient quality of much of the milk sold in the city, and the Health Department has undertaken the inspection of milk and dairies within the city limits.

With this exception the inspection of food products is left to the *State Board of Health*. This board is doing valuable work throughout the State in exposing unsanitary conditions and suggesting the proper remedies. The inspection of dairies in the suburbs of Baltimore is now being carried on with vigor.

A number of charitable societies are also aiming to improve the general health of their beneficiaries rather than to cure diseases. For this purpose the *Free Summer Excursion Society* was organized in 1875. Picnic grounds are owned at Chesterwood, on the Patapsco river, to which about 15,000 women and children are taken each year upon day excursions. Free bathing privileges and two free meals are supplied.

*St. Lukeland* is the name of a summer sanitarium near Catonsville, owned and managed by the Hospital Relief Association. During the last season seventy-two women and girls were given the advantage of two weeks of needed rest and recuperation.

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*The first number is for May, 1893.

The *Fresh Air Fund* of the Young Women's Christian Association assisted one hundred and sixty-nine working girls to a fortnight's vacation in the country, or at the seashore, by paying transportation or board; and an association of young women, known as the *Co-operative Workers*, have provided a summer home where self-supporting girls may enjoy a two-weeks' vacation in the mountains at small expense. Vacation Lodge, the new home owned by this Society, was opened at Blue Ridge Summit June 8, 1893.

### DISPENSARIES AND HOSPITALS.

For the treatment of the sick and injured Baltimore is provided with twenty-four hospitals and as many dispensaries, and one hospital is located in Cumberland.

The dispensaries are for the most part simply free out-patient departments of the hospitals, and need not be mentioned separately. A number, however, are independent, deriving their support jointly from contributions, small investments, and city appropriations. To this class belong the *Baltimore General Dispensary*, established in 1801, the *Eastern*, *Northeastern* and *Southern Dispensaries*.

The *Homœopathic Dispensary*, on Greene street, has been one of the most active, but is now (June, 1893,) closed. Perhaps the most progressive of these agencies of relief is the *Evening Dispensary for Working Women and Girls*, on South Charles street, organized and conducted by women physicians.

At nearly all the dispensaries treatment is given free of charge, though, nominally, at least, to those only who are unable to pay. To avoid the pauperizing tendency of free treatment the Johns Hopkins Dispensary and the Evening Dispensary for Women usually make a charge of ten cents for treatment, or, as respects the Evening Dispensary, of twenty-five cents for treatment and prescription. As a rule, treatment is given at the dispensaries only, though a number of the organizations extend their services also to the homes of the indigent sick.

Three of these hospitals are under public control—the *United States Marine Hospital*, supported by the federal government for the care of American seamen; the *Quarantine Hospital*, supported by the city at the quarantine station, twelve miles down the bay; and the old quarantine, or *Pest Hospital*, which occupies a valuable piece of land four miles from the city*. The City Council has appropriated $8,000 for the erection of a steam disinfecting plant at the quarantine station, and also $45,000 ($10,000 for the site), for a more available *Hospital for the Treatment of Infectious Diseases*.

*The medical and surgical department of the Bay View Almshouse constitutes another free hospital under city control.

The other hospitals are under private control, though eight of them are aided by the support of two hundred and seventy-five beds at $3.25 per week on the part of the city, and six of them receive appropriations from the State. Two are special hospitals for lying-in women, and two are for the treatment of the eye, ear, and throat only. All the general hospitals receive both pay and free patients, usually in about equal numbers. To pay patients the charge, including board, medical attendance and nursing, ranges from three to thirty-five dollars per week.

Seven of these are connected with the seven medical schools of Baltimore. The *Hospital of Baltimore University* and the ***Maryland Homœopathic Hospital*** are explained by their names. The ***Hospital of the Good Samaritan*** is connected with the Woman's Medical College, and the *Maryland General Hospital* with the Baltimore Medical College.

The *Maryland University Hospital*, on Lombard street, was established in 1823, and has maintained a training school for nurses since 1889. Under the same university is a free lying-in hospital, with a training school for nurses in obstetrics.

The *City Hospital*, on Calvert street, is connected with the College of Physicians and Surgeons, though it is owned and managed by the Sisters of Mercy. One hundred free beds are supported by the city, and they, with about as many others, are always full. Many accident cases are received from the railways and factories, and the dispensary is open day and night for their treatment.

Much more might well be said concerning the good work of these hospitals, but a wider interest attaches to the one which we come to next—the *Johns Hopkins Hospital*, doubtless, upon the whole, the leading institution of the kind in America. Mr. Henry C. Burdett, in his great work upon the Hospitals and Asylums of the World, introduces a detailed description of this institution with the following words: "Seldom, if ever, has a hospital been started on its career of usefulness with such deliberate care, such wise forethought, such self-sacrificing search after the best way, as have been devoted to the institution now to be described." The income from the endowment (the endowment now amounts to about three and one-third millions of dollars) was placed at the disposal of the trustees in 1873, and their activity began at once. Several years were devoted to perfecting the plan, and the utmost care was given to every detail of the construction, so that when the institution was opened in 1889 Dr. J. S. Billings of the United States Army, who had made a special study of European hospitals, was able to affirm that in regard to construction these were "the best built buildings of their kind in the world." The hospital occupies four squares, covering about

JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

fourteen acres, upon an elevated site in the eastern part of the city. It is built upon the pavilion system, the complete plan calling for twenty-five buildings, of which nineteen have been completed. The system of ventilating and heating is especially perfect, and something of its magnitude is shown by the total length of the piping in the buildings, which is said to be over sixty miles. The heating is done by warm water radiators, through which the incoming air passes, so that the temperature of this air may be regulated at will without changing its volume. A constant flow of fresh air to the amount of about one cubic foot per second for each individual occupying a ward is maintained in all conditions of the weather. The registers are so arranged that the current of air never passes from one bed to another, but directly from each bed to a ventilator located underneath or in a central shaft. An account of the special features of the construction, many of which have been worked out with great care, fills many pages of the large quarto description published by the trustees of the hospital, and constitutes a valuable guide to those who are preparing plans for such buildings.

The fifty-eight private rooms for pay patients are nearly always occupied, and the free wards contain an average of about one hundred and twelve patients. The total number under treatment in the hospital last year was 1,970, while the out-patient department prescribed for 41,114 others.

The nursing is well organized, with a superintendent, eleven head nurses and forty-four pupils. The training-school for nurses is especially efficient. The instruction extends over a period of two years, and embraces a course of six weeks in the art of cooking.

The Johns Hopkins Hospital, though upon an independent foundation, is closely connected with the Johns Hopkins University, and fosters the same spirit of research and maintains the same high standard of attainment for which the University is noted. No pains have been spared in securing an able staff of physicians, and the advancement of medical science is an object constantly held in view.

The educational work of the hospital will soon be greatly increased by the opening of the Medical School of the Johns Hopkins University, of which it was designed to become a part.

The other hospitals of Baltimore are not connected with educational institutions, direct medical relief being the motive for their establishment. The largest hospitals of this class are the *St. Agnes' Sanitarium,* just outside the city to the southwest, where patients suffering from alcoholism, as well as from other complaints, are treated; and *St. Joseph's Hospital,* on Caroline street. Both are owned and managed by Catholic Sisters, the former by the Sisters of Charity, the latter by the Third Order of the Sisters of St. Francis.

The *Hospital for the Women of Maryland* was established in 1882 by an association of women, which continues in control with an active membership of thirty-three. Skilled surgeons are in charge, and much good work has been done in alleviating the sufferings of women. A free dispensary is connected with the hospital.

The *Union Protestant Infirmary* is also managed by a board of charitable women, and derives its support from investments, board of pay patients, and annual subscriptions.

The remaining hospitals supply a home for incurables as well as temporary treatment for acute cases. The *Church Home and Infirmary*, on Broadway, occupies a commanding position, overlooking the harbor and city. The interior is nicely fitted up with many memorial rooms and beds supported by individual churches of the Protestant Episcopal denomination. Upon the first of February there were seventy-seven inmates, of whom forty-four were supported by the church, twenty-eight were pay patients, and five were free. According to the last printed report forty-four remained in the hospital during the entire year.

The *Hebrew Hospital and Asylum*, situated opposite the Johns Hopkins Hospital, is a well conducted institution reporting, upon the first of January, twenty-two inmates in the Hospital and the same number in the asylum. The Hebrew population of the city are careful to support their own poor, and the asylum department of this institution constitute the Hebrew home for the aged and infirm.

At the *Home for Incurables*, on Twenty-first street, only women who are without hope of recovery are received. It is conducted like a home for the aged, an admission fee of two hundred dollars being charged.

The *Home and Infirmary of Western Maryland*, located at Cumberland, has nine permanent inmates under the regulations of a home for the aged. The work of the hospital department is increasing. At the time reported ten patients were in the infirmary for treatment. In October, 1892, a new building was opened, toward which the State Legislature appropriated $10,000.

### OTHER RELIEF FOR THE SICK.

Several societies have been organized as aids to the work of the hospitals. The *Hospital Saturday and Sunday Association*, by means of special collections in churches and business places, raises about $2,000 annually for the support of free beds in hospitals. The *Hospital Relief Association, of Maryland*, carries on a varied work, with the general purpose of making life more agreeable to the unfortunate inmates of the hospitals. The seven standing committees are on books, pictures, visiting and delicacies, flowers, first aid to injured, the press, and music, respectively. To the activity of this Association are due the Home for

Incurables, the Hospital Saturday and Sunday Association, and the St. Lukeland Sanitarium.

The *Hospital Clothing Club* is composed of about fifty members who contribute their services and money for supplying needed garments to the indigent sick in hospitals.

For work outside of hospitals the *Indigent Sick Society* was organized, according to the Baltimore Charities Directory, some seventy years ago, and in 1890, four hundred and seven sick persons were relieved, with small sums of money or otherwise. The *Hebrew Young Men's Sick Relief Association* is explained by its name. Relief is given mainly by gifts and loans.

The *Mothers' Branch* of the Young Women's Christian Association provides assistance, including nursing and medical attendance, for needy women in confinement. Free nursing, outside of institutions, is also done by the sisters of the *Convent of Bon Secours*, the deaconesses of the Methodist Deaconess Home, a nurse connected with the Evening Dispensary for Women, and, during the summer, the nurses employed by the Thomas Wilson Sanitarium, as well as by other agencies less generally known.

Outside of Baltimore, and aside from the Home and Infirmary of Western Maryland, the most thoroughly organized association for the relief of the sick, is the *Hospital Club*, of Annapolis, composed of women, organized under the direction of the Rector of St. Anne's Parish. Bedding, clothing, invalid chairs and other appliances for the sick-room are kept in store, and supplied to those in need, together with medical attendance, nursing, and other forms of relief.

### HOSPITALS FOR THE INSANE.

For the care of the insane, Maryland at present has but one State institution, but public opinion favors State care for the insane, and the crowded condition of the existing institutions, especially of the city asylum, lends an added force which will probably soon result in the building of more State hospitals.

Of the 1,816 insane patients reported in the institutions of Maryland on the 30th of June,* 1892, 427 were in the State hospital, 371 in the city hospital (Bayview), 249 in county hospitals, including Montevue and Bellevue, 139 in county almshouses, and 630 in private institutions.

Each public patient, even those in the State hospital, is maintained at the expense of the county (or city, in case of Baltimore), from which the patient comes. Many of these county patients are treated in the private asylum at Mount Hope, while others are cared for in the four county institutions which have been granted licenses by the Lunacy

* In some cases other more recent dates had to be taken instead of June 30.

Commission permitting them to receive pay patients. The uniform rate paid for public patients is one hundred and fifty dollars per year.

General supervision of all institutions which care for the insane is vested in a *State Lunacy Commission* appointed by the Governor. Every almshouse or hospital in which the insane are kept must be visited at least once every six months. The commission has full power of examination, and all cases of supposed cruelty, neglect, or unjustifiable detention are investigated and acted upon. A statute requires that every inmate of an asylum have full liberty to correspond with the Lunacy Commission once each month. The annual report of the commission gives a brief account of the condition of each institution, together with statistical tables from the principal hospitals.

The *Maryland Hospital for the Insane* grew out of a general hospital which was founded before the close of the last century, occupying the present site of the Johns Hopkins Hospital. It has been devoted to the care of the insane since 1840, and has occupied the present location, known as Spring Grove, near Catonsville, since 1872. The building is a handsome, well arranged structure of Maryland granite. The eighteen wards permit classification and promotion. Careful attendance takes the place of physical restraint, and employment is given to divert the mind. The last report of the Board of Managers states that "After the contemplated improvements have been completed, for which the last session of the Legislature made appropriations, we doubt if there will be any better equipped institution in the country." Of the four hundred and twenty-seven patients under treatment upon the 31st of October, 1892, twenty-nine were private patients, one hundred and forty-seven were supported by Baltimore City, and two hundred and fifty-one by the various counties. The managers of the hospital are appointed by the State governor, and an annual appropriation on the part of the State supplements the fee of one hundred and fifty dollars a patient paid by the counties and city.

The largest of the hospitals for the insane, *Mount Hope Retreat*, is under private management, being owned and conducted by the Sisters of Charity of St. Joseph's. The five-story brick building occupies a beautiful eminence five or six miles northwest of Baltimore. The institution is highly praised for its general management, and especially for the care taken to divert the minds of the patients by agreeable employments and amusements. That the Retreat has a national reputation is indicated by the fact that about one-third the inmates come from outside the State. About one-half are public patients committed, for the most part, from Baltimore city. In addition to the insane patients, some ten or twelve persons are usually under treatment for inebriety.

Another notable institution for the insane is the *Sheppard Asylum*, excepting the Johns Hopkins Hospital; the most costly charitable institution in the State, and unique among American Hospitals for the Insane in being founded and endowed by the charity of one individual. Moses Sheppard organized the board of trustees in 1853, and at his death, in 1857, bequeathed to them his estate, amounting to $567,632. From the income of this fund the asylum has been built at a total expense of over a million dollars, while the endowment itself has increased to $669,154. The founder "expressed the wish that the experiment might be tried to ascertain how much good would result from an unlimited amount of attention to everything that could possibly alleviate the condition of the insane."* The trustees proceeded with care, and it was not till November, 1891, that the hospital was opened for the reception of patients. Fifty-three were treated during the first year, all but two of whom were charged for board in full or in part. Advancement in the treatment of the insane is the central purpose in the management of the institution. As in Mount Hope Retreat, a training-school, with regular lectures and demonstrations, is provided for the instruction of the nurses.

Two other private hospitals may be mentioned here as treating the insane, though they are not managed as charities—the *Matley Hill Sanitarium*, at Relay Station, reporting twenty-four inmates, and the *Richard Gundry Home*, with seventeen inmates, at Catonsville.

Two of the counties support hospitals for the insane, independent of the almshouses in respect to their accounts and superintendency, though managed by the same board of county commissioners. *Sylvan Retreat*, near Cumberland, reports sixty inmates. In addition to the indigent insane of Allegany county, a number of pay patients are under treatment, and a few inmates are supported by other counties. The *Cecil County Insane Asylum* is located at Cherry Hill, two and a-half miles from Elkton, and, like Sylvan Retreat, is built upon the county poor farm. Twenty-seven inmates are reported.

The Baltimore City Insane Hospital, and two other county hospitals for the insane, are constituent departments of the almshouses, and will be considered in the following section:

## ALMSHOUSES.

In spite of the many lines of effort in their behalf, large numbers of incapable people fall back upon the State for support and find shelter in the public almshouses.

The aggregate average number of inmates of these institutions in Maryland, according to the reports received last year, is two thousand one hundred and eleven.

* Announcement of the Sheppard Asylum, 1891.

Of this number, one thousand two hundred and eighty-eight must be assigned to the great city almshouse, known as *Bayview Asylum*, the largest institution that comes within the scope of this chapter.

The buildings and farm have a favorable location just outside the city to the east. The institution is composite in its nature, comprising a large hospital for the insane, a home for the infirm and aged, a hospital for medical and surgical cases, and a shelter for vagrants.

Admissions to the almshouse are obtained from the purveyor,* who has an office at the City Hall. Every day brings its allotment of needy and afflicted applicants. During the busy season of the year, medical treatment is most often required, and for this, applicants are assigned to the city beds in the subsidized hospitals as well as to the almshouse; but when the cold weather renders it more difficult to obtain an independent living, great numbers of incompetent and improvident men apply for protection from cold and hunger. The number of inmates is at present increasing from year to year. In 1876 the daily average population in all departments was seven hundred and ninety-three; in 1883, seven hundred and ninety-seven; in 1884, seven hundred and twenty; in 1885, eight hundred and seventy-three; in 1889, one thousand and sixty-eight; in 1891, one thousand one hundred and forty-one; in 1892, one thousand two hundred and eighty-eight. The largest number ever sheltered in the almshouse at one time was during the past winter. On the 30th of January, 1893, one thousand eight hundred and fifty-four inmates were reported, of whom one thousand two hundred and ninety-seven were white men; three hundred and thirty-two white women; one hundred and twelve colored men; ninety-eight colored women, and fifteen were children (imbeciles, epileptics, and infants). Out of this number one thousand five hundred and eighty-one were reported as "under medical treatment," two hundred and sixty-three were employed in the various departments of the household, and ten were boarders.

The report for May 8, 1893, shows that the number of white men in the almshouse was 697 less than it was upon the 30th of January, while all the other numbers remained about the same. The regulations of the institution require that all inmates "who may be in a condition to labor shall be kept at some suitable employment." This rule is fairly well enforced in the summer and autumn, but with the present equipment it is not found feasible to give employment to the men who throng the house during the winter months. Of the permanent inmates about 400† are over sixty years of age, and about 375 are insane. During the last year 1,864 medical cases and 1,127 surgical cases were treated in the hospital wards,

* People arrested for vagrancy are sometimes committed to the Almshouse for a definite time, but no means are provided for the prevention of escape.

† Estimated by the superintendent.

while many others were prescribed for in a dispensary connected with the institution. The medical and surgical department is under the control of the College of Physicians and Surgeons and the Maryland University, and the medical treatment in the department for the insane is under the management of the Medical School of Johns Hopkins University.

It is apparent to the trustees of the poor, as well as to others who have taken an interest in the matter, that the hospital for the treatment of the insane should be entirely distinct from the almshouse in order that the whole system of management may be founded upon different principles in the two institutions. Some change in this direction will doubtless be brought about in the near future, but whether the State or the city will take the initiative is not yet apparent. Meanwhile the department for the insane is being managed as well as the meagre equipment allows. The whole institution is kept in good order, and aside from the lack of work for the winter residents, the management receives quite general praise. The annual cost of maintaining the institution is from seventy-two dollars to eighty dollars per capita.

All but three of the twenty-three counties of Maryland have provided *County Almshouses* for the care of the indigent, though, as already stated, a much larger number of poor people are given partial support through pensions from the county treasuries.

In some counties the poor relief is managed directly by the Board of County Commissioners, while in others Trustees of the Poor are appointed. In all the almshouses good management is stimulated by the regular visits of the Grand Juries, the Lunacy Commission and the Prisoners' Aid Association. Though many features are still subject to improvement, the more gross abuses have been abolished, the sexes have been separated, the rooms are usually kept fairly neat and comfortable, and a State law, which is now well enforced, provides that no capable child over three years of age shall be kept in an almshouse for a longer period than ninety days. A few chronic cases of insanity are sheltered in nearly all the almshouses, but acute cases are taken to hospitals for curative treatment.

As previously stated, two of the counties have provided separate institutions for the insane. Two others, while placing the insane under the same management as the paupers, have made special permission for their treatment, and have been licensed by the Lunacy Commission to receive insane persons from other counties for pay.

*Montevue Hospital,* the Frederick County almshouse, is the leading county institution for the insane. The superintendent reports two hundred and twenty-eight inmates, of whom one hundred and twenty-four are insane. Fifty-eight are maintained at the expense of fourteen other counties, and five are detained for the State Penitentiary.

The Washington County Almshouse, known as the *Bellevue Asylum*, returns seventy inmates, of whom thirty-eight are insane. The building is well constructed from a sanitary point of view, and the inmates, as in Montevue Hospital, are kept employed.

Among the other almshouses which are especially well constructed and managed, mention may be made of those of Cecil, Harford, Talbot and Baltimore counties. In Kent county the large county farm of 300 acres is placed under separate management, so that the superintendent of the almshouse may give his entire attention to the buildings and inmates.

HOMES FOR THE AGED.

It is generally thought that shelters for paupers and tramps may be made too inviting, especially by the absence of compulsory labor, but all are glad to see the aged and infirm passing their last years amid the comforts of a pleasant home, though ill-fortune may have deprived them of property and of supporting relatives.

For such people ten homes are provided by private charity, aided in many cases by public appropriations. Two of the homes included in this number have no age limit, and will, therefore, receive our attention first.

The Maryland Line *Confederate Soldiers' Home* occupies a beautiful site at Pikesville, Baltimore county. The building was formerly a United States arsenal, donated by the federal government to the State, and by the State to the Association of the Maryland Line for the purpose of a home for needy, infirm ex-Confederate soldiers. The inmates number seventy-five.

Eleven aged women are given unusually pleasant surroundings in the *Home for Confederate Widows and Mothers*, on St. Paul street.

In respect to the number provided for, the leading home for the aged of Maryland is that supported by the *Little Sisters of the Poor*, on Preston and Valley streets. It is a strictly charitable institution. Only those are received who are indigent, worthy and over sixty years of age, and no admission fee is required. The large buildings, accommodating three hundred inmates, are always full and applications are made some time in advance of admission. The rooms are kept in the best order and all the surroundings are comfortable. The support of the home is derived largely from the donation of supplies by dealers and others, from whom the sisters solicit help.

The Little Sisters of the Poor were organized in France, about the year 1840. The Mother House, where all the sisters have resided for their novitiate, is at St. Servan, in Lower Brittany. Over four thousand

sisters have been sent out to care for the aged poor in all parts of the world. The community in Baltimore numbers seventeen.

The other Maryland homes for the aged are under Protestant management. All are well conducted and provide many of the advantages of family life. As a rule, each inmate has a room by himself. Only agreeable people sixty years or more of age are received, and an admission fee is required, varying, in respect to the homes for white people, from three hundred dollars to one hundred and fifty dollars, according to the age of the applicant.* The homes for colored people receive a uniform fee of one hundred dollars. It is usually required also that any pension or further property belonging to the inmate, or falling to him, shall be given up to the home. In many cases the fees are paid by churches or friends of the applicants.

The oldest institution of this kind is the *Aged Women's Home*, on west Lexington street. It is managed by the Baltimore Humane Impartial Society, which was organized for the care of widows and orphans, in 1802, though the home was not established till 1850.† In 1864, the building was enlarged, and the *Aged Men's Home* was opened by the same society.

The *Home of the Aged of the Methodist Episcopal Church*, on Fulton avenue, provides a pleasant home for fifty-five inmates, all but five of whom are women. It was founded in 1867.

The *Allgemeine Deutsche Greisenheimat* occupies a fine, well-kept building on West Baltimore street. Both men and women are received, and one married couple is provided for.

The *Shelter for Aged and Infirm Colored Persons*, on west Biddle street, is managed by an association of white subscribers. Thirty-two colored women occupy the home.

The *Aged Men and Women's Home* provides a comfortable shelter for fifteen colored people in South Baltimore. The management was reorganized last year and placed in the hands of the nine Colored Methodist Churches of Baltimore. Each church supports the home for one month at a time.

The youngest and one of the most carefully organized of the Maryland institutions of this class is the *Home for the Aged*, opened at Frederick October 26, 1892. All fees and donations in sums exceeding one hundred dollars are added to the endowment fund, but inmates have for their own use the interest of all money donated by them in excess of their admission fees.

Thus we have followed the wards of the public from the foundling hospital and the orphanage, through the many variations of dependency

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* The Lexington street homes make an extra charge for admissions from outside the city.

† Baltimore Directory of Charities.

and delinquency, to the institutions and homes which provide a shelter for their declining years, but charity has not completed its work even when death releases the soul from want. Something of the ancient fear of remaining unburied seems to survive in the modern aversion to the potter's field. This general sentiment causes many a hard-earned dollar to be stored away, but more often causes a debt to be contracted, which results in financial distress, or even pauperism, for the surviving widow or mother. Nearly all the charitable institutions make provision for the burial of inmates, private charity often supplies the bereaved with the needed funds, and the Hebrew Free Burial Association relieves the Jewish population from this form of distress. In a few cases where friends of a deceased person can only pay for a grave, the city gives free burial in any cemetery, yet each year from five to six hundred bodies are buried by the Health Department in the two public cemeteries—one upon the eastern and one upon the western outskirts of the city. A wooden slab marks the grave, and a carefully kept record preserves its identity.

But while the relationship of Charity to the individual ends with this sad picture, let it not be imagined that her beneficiaries usually remain dependent to the end. At each stage of the earlier development children, men and women are being rescued from destitution and degradation, and restored to the ranks of happy, useful, independent life. Many preventive measures are still to be inaugurated, and better organization will render the curative work more effective; but in the great fund of charitable effort and purpose, the manifestations of which have been partly portrayed in this chapter, lies the promise of indefinite social improvement.

# INDEX.

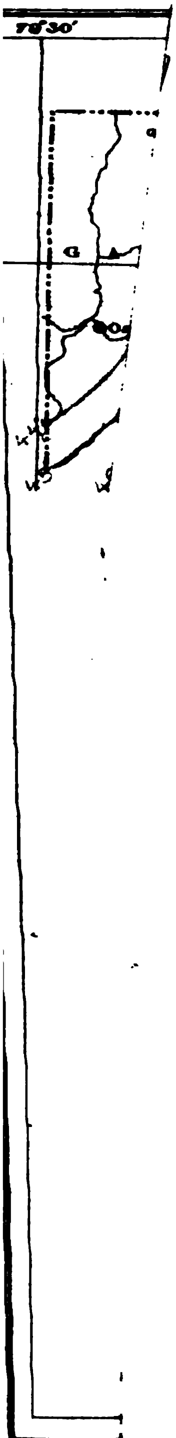


PHOTO LITH. B

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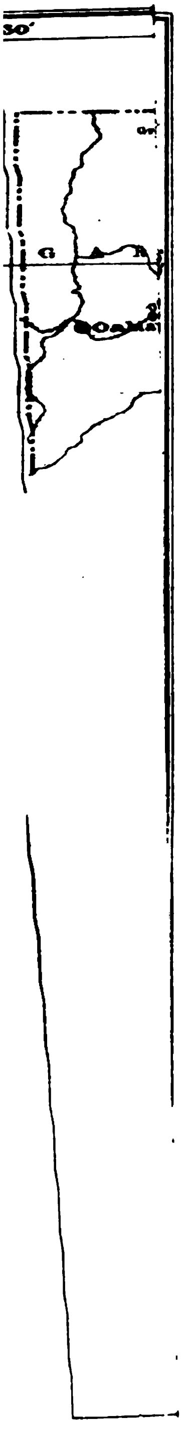


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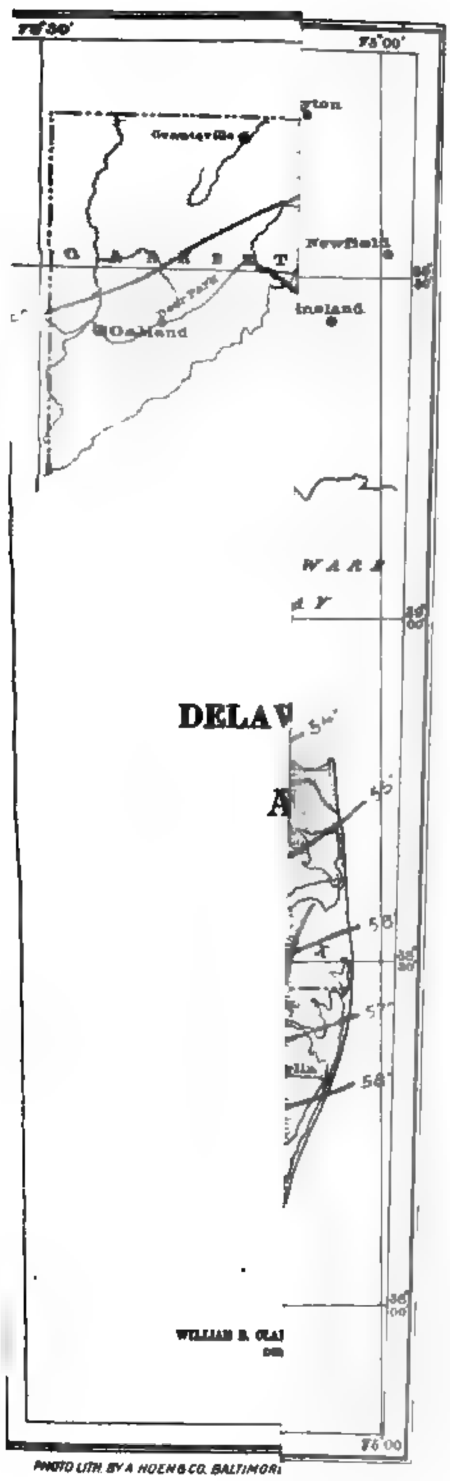

75°30'
75°00'
Newfield
Oakland
DELAW
WILLIAM B. CLA
PHOTO LITH. BY A HOEN & CO. BALTIMORE

# THE GEOLOGICAL MAP.

The Geological Map of Maryland which accompanies this volume has been compiled from all existing sources of imformation, and contains the results of much geological work within the confines of the State which has never before been published. The map is nevertheless of only a preliminary character, since no systematic survey of the State as a whole has ever been carried on. The amount of reliable information for different parts of the area is very unequal. In some portions—especially the Eastern Shore and Garrett County—very few observations have been made, while in others much detailed work has been done. The geologists who have been accepted as authorities for different parts of the State are indicated on the sketch map in the legend. Assistance has also been obtained from the publications of the Pennsylvania Geological Surveys and from Prof. W. B. Rogers' geological map of Virginia.

The only other geological map of Maryland which has ever been issued is that contained in P. T. Tyson's first Annual Report as State Agricultural Chemist in 1860. While not yet complete, the present map will at once be recognized as a great advance over this earlier publication. It thoroughly represents the present state of our knowledge, and will serve as a definite point of departure for future work by showing where the existing data is least satisfactory.

The base of the geological map of Maryland is the outline of the State, including Delaware, carefully drawn by the U. S. Geological Survey for the Maryland State Weather Service in 1891. It is accurate for boundaries, drainage, and the location of towns, but has no topography or roads. Its scale is 1:500,000, or approximately eight miles to the inch.

The remarkable completeness of the geological record found within Maryland's territory has rendered a large number of tints and colors necessary. Twenty-nine of these have been employed, although the

**number of separate formations in reality is much greater. To avoid confusion, similar or unimportant horizons have, in many cases, been united. The indicated subdivisions fall naturally into three main series: eight pre-Paleozoic, thirteen Paleozoic and eight post-Paleozoic. Inasmuch as these series also correspond quite closely to the three topographic provinces of the State—Piedmont Plateau, Mountains and Coastal Plain—the colors have been so arranged as to express these great divisions in tints of the three primary colors: red, blue and yellow.**

**Letter symbols have been used to designate the different formations, except in the case of the Paleozoic strata, where the old and well established numbers of the Pennsylvania Surveys have been retained. No attempt has been made to apply the colors to the generalized section which runs across the top of the map, because of the difficulty in obtaining a perfect register in chromo-lithographing such minute areas. The vertical exaggeration (about eight times) of this section is believed to be justified because of the very low relief in the eastern part of the State.**

**The practical value of this map is greatly enhanced by the agricul-**tural designations which Professor Whitney has assigned to the various formations in the legend. These will enable the farmer to use it with reference to the crops for which his lands are best suited.

Too much cannot be said in praise of the care and pains which Mr. A. B. Hoen, of the firm of Hoen & Co., has expended upon the artistic reproduction of this map. The successful preservation of sharp contrasts in its colors and their distribution in three main areas, without the least sacrifice of harmonious blending and pleasing general effect, is due entirely to his experience and skill.

G. H. W.

VE

RD